FINAL

KC-46A FORMAL TRAINING UNIT (FTU) AND FIRST MAIN OPERATING BASE (MOB 1) BEDDOWN EIS

Prepared for:
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Air Education and Training Command
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RECORD OF DECISION FOR THE KC-46A FORMAL TRAINING UNIT (FTU) AND FIRST MAIN OPERATING BASE (MOB 1) BEDDOWN

Introduction

The United States Air Force (USAF) is issuing this Record of Decision (ROD) for the KC-46A Formal Training Unit (FTU) and First Main Operating Base (MOB 1) Beddown Environmental Impact Statement (EIS) (*Federal Register* (FR), Vol. 79, No. 55, EIS No. 20140074, page. 15741, March 21, 2014). In making this decision, the information, analysis, and public comments contained in the KC-46A FTU and MOB 1 Beddown Final EIS (FEIS), along with other relevant matters, were considered.

This ROD is prepared in accordance with the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) at Title 40 *Code of Federal Regulations* (CFR) §1505.2, (*Record of decision in cases requiring environmental impact statements*) and 32 CFR§989, Environmental Impact Analysis Process (EIAP). The USAF is the Lead Agency and there are no cooperating agencies.

Specifically, this ROD:

- States the USAF's decision (page 1 and 10);
- Identifies alternatives considered by the USAF in reaching the decision (page 2) and specifies the alternative considered to be environmentally preferable (page 2);
- Identifies and discusses relevant factors that were considered in making the decision among the alternatives, and states how those factors entered into the decision (page 3); and
- States whether all practicable means to avoid or minimize environmental harm from the selected alternative were adopted, and if not, why they were not adopted, and summarizes the applicable mitigation (see pages 4 through 10).

Decision

The USAF will, by this decision, beddown up to eight (8) KC-46A Primary Aerospace Vehicles Authorized (PAA) under Air Education and Training Command (AETC) for the FTU at Altus Air Force Base (AFB), OK and thirty-six (36) PAA under Air Mobility Command (AMC) for the MOB 1 at McConnell AFB, KS. (ROD, page 10).

Background

For more than 50 years, the KC-135 Stratotanker has served as the aerial refueling backbone to project U.S. global reach and combat power. The U.S. Congress authorized and appropriated funds supporting the USAF's selection of the KC-46A as the newest aerial refueling aircraft to replace a portion of the aging fleet of KC-135s. Congress funded a total aircraft inventory of up to 179 KC-46A aircraft by 2028 to correct deficiencies, update the fleet, enhance operations, and increase mission effectiveness. The new KC-46A will provide updated technology designed to enhance operations and increase mission effectiveness to support USAF, Navy, Marine Corps, and allies who rely on tanker range and flexibility to strengthen the coalition mission.

This basing action is only part of the USAF's program to replace the older KC-135 aircraft. This ROD focuses on the location for the USAF's KC-46A FTU and MOB 1. The National Guard

Bureau is preparing a separate EIS that will support an independent decision to beddown twelve (12) KC-46A aircraft at a Second Main Operating Base (MOB 2) to be operated by the Air National Guard (ANG). Following these initial beddown actions, the USAF will plan additional beddown actions in the future for the remaining KC-46A aircraft.

Alternative Identification

As more fully described in the FEIS (Volume I, pages 2-2 through 2-4, §2.2), AMC presented the Lead Command Intent for the KC-46A to the Secretary of the Air Force (SecAF) in September 2011. This Lead Command Intent included planning conventions that described the proposed basing action tenets, force structure mix, and basing timelines. These planning conventions included the critical information that would be used to shape and inform decisions made throughout the KC-46A Strategic Basing Process. Initial screening yielded a defined enterprise of 54 bases to be evaluated for the FTU and MOB 1 beddowns.

In 2012, AMC presented objective screening criteria to the SecAF. The approved screening criteria were used to screen the enterprise of 54 bases to identify those bases' capacity to successfully support the FTU and MOB 1 missions. The objective criteria included mission, capacity, environmental considerations, and cost.

The Strategic Basing Process described above resulted in the identification of two alternative bases for consideration for the KC-46A FTU mission and four alternative bases for the MOB 1 mission. Although Altus AFB and McConnell AFB were identified as alternative bases for both the FTU and MOB 1 missions, neither base would be selected to host both missions because of the inherent conflicts and capacity issues associated with beddown of both training and operations squadrons at a single base.

The basing alternatives considered were:

- FTU Scenario
  - Altus AFB, Oklahoma
  - McConnell AFB, Kansas
- MOB 1 Scenario
  - Altus AFB, Oklahoma
  - Fairchild AFB, Washington
  - Grand Forks AFB, North Dakota
  - McConnell AFB, Kansas

The No Action Alternative was evaluated for each of the alternative basing locations and constitutes the baseline conditions at each alternative location and other constraints (see FEIS, Volume I, page 2-54, §2.5).

Environmentally Preferred Alternative

The environmentally preferred alternative is considered to be the No Action Alternative. The No Action Alternative constitutes the baseline conditions at each alternative location and would not substantially change existing environmental conditions.

Basis of Decision

Altus AFB was selected for the FTU mission because it provides training opportunities with both tankers and other heavy receiver aircraft, has available infrastructure capacity and extensive fuels dispensing capability, and requires considerably less new construction. In addition, KC-135 aircraft are currently located at Altus AFB.

McConnell AFB was selected for the MOB 1 mission because it has the lowest military construction costs and is located in a region of high air refueling receiver demand. McConnell AFB currently has 44 KC-135 aircraft and will replace those aircraft with 36 KC-46A aircraft which would reduce manpower authorizations.

Public Involvement

Public involvement was integral to the USAF's development of this EIS. Public and agency comments were received and considered, including those received during scoping, at public hearings, and during the public comment period on the Draft EIS.

Information reflecting public involvement can be found in the FEIS (FEIS, Volume I, pages 1-6 to 1-8, §1.5; Volume I, Chapter 6). Furthermore, FEIS Volume II, Appendix A, provides public involvement documentation as well as copies of comments received during the Draft EIS public comment period. Public notices and meetings included:

- Notice of Intent: Published March 26, 2013, in the FR, Volume 78, Number 58, page 18325.
- Scoping Period: Initiated March 26, 2013, and ended May 17, 2013. Scoping meetings were held near each of the four bases in Oklahoma, Washington, North Dakota and Kansas.
- Draft EIS Notice of Availability (NOA): Published October 25, 2013, in the FR, Volume 78, Number 207, page 63977.
- Public Comment and Review Period: A 45-day comment period was initiated with the NOA publication in the FR and ended on December 9, 2013.
- Public Hearings: During the public comment period, four hearings were held near each of the four bases in Oklahoma, Washington, North Dakota and Kansas.
- FEIS NOA: Published in the FR on March 21, 2014, Volume 79, No. 55, EIS No. 20140074, page. 15741. This initiated the mandatory 30-day waiting period prior to ROD signature.

Agency Coordination and Consultation

As described more completely in the FEIS (Volume II, Appendix A), the USAF coordinated and consulted with Federal and state agencies and Federally Recognized Tribes (Tribes). The Federal and state agencies responsible for biological and cultural resources were contacted early in the environmental planning process and received USAF notification of the project in March 2013. The USAF consulted on all of the alternatives in the FEIS. However, the descriptions which follow below describe only the consultations associated with the two selected alternatives, Altus AFB for the FTU and McConnell AFB for MOB 1.

Regulatory consultations included informal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act. The USAF determined, through informal consultation with the USFWS, that there are no Federal or state threatened or endangered species in the regions of influence at Altus AFB and McConnell AFB. Therefore, no further consultation was required.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), the USAF initiated consultation with the State Historic Preservation Offices (SHPOs) in Oklahoma and Kansas. For the FTU mission at Altus AFB, the Oklahoma SHPO has concurred with the USAF determination of no adverse effect, concluding the Section 106 consultation process (FEIS Volume II, Appendix A, page A.5-6). For the MOB 1 mission at McConnell AFB, the USAF has signed a Memorandum of Agreement (MOA) with the Kansas SHPO agreeing to measures that mitigate the adverse effect on historic properties resulting from implementation of the MOB 1 mission (FEIS, Volume II, Appendix A, pages A.5-35-A.5-38). In addition to the coordination and consultation with Federal agencies, the USAF also completed government-to-government consultations with potentially affected Tribes.

For the FTU mission at Altus AFB, no adverse Section 106 impacts to tribal resources are anticipated. Consultation with 10 tribes resulted in agreement with the USAF finding of no adverse impact. Section 106 consultation for the KC-46A FTU mission at Altus AFB is complete (FEIS, Volume II, Appendix A, page A.3-1, §A.3; pages A.4-1 to A.4-7, §A.4).

For the MOB 1 mission at McConnell AFB, no adverse Section 106 impacts to tribal resources are anticipated. Consultation with 12 tribes resulted in agreement with the USAF finding of no adverse impact. Section 106 consultation for the KC-46A MOB 1 mission at McConnell AFB is complete (FEIS, Volume II Appendix A, pages A.3-1 to A.3-4, §A.3; pages A.4-18 to A.4-22 §A.4).

No agency coordination or consultation was required for air quality. Both Altus AFB and McConnell AFB are located in attainment areas; therefore, a general conformity determination was not required for implementation of the FTU or MOB 1 mission at either base.

Mitigations and Management Actions

The USAF considered and adopted all practicable means to avoid or minimize environmental harm at both installations. For the purposes of this ROD and future mitigation planning, management actions are defined as those actions that are built or designed into the proposed action and alternatives and either prevent or minimize impacts.

Specific management actions (i.e., those required by regulation or USAF guidance and instructions) to facilitate the implementation of the decision were identified in the FEIS and will be carried forward and implemented (FEIS, Volume I, pages 2-67 through 2-70, §2.9). Mitigation measures and management actions are summarized below by their applicable environmental resource areas. Compliance laws and regulations administered by the US EPA and other regulatory and/or state environmental quality agencies are mandated, and although the laws and regulations have mitigating effects, they are not considered discretionary with respect to Air Force decision making.

Given the early developmental stage of the KC-46A program, identification of new data and information relative to the KC-46A may arise and it is possible that the impacts identified in the

FEIS (Volume I, pages 2-55 through 2-62, §2.7, Table 2-21) may be different from those expected. An understanding of various aspects that are part of a complex interrelated KC-46A operational environment may not be achieved without a more long-term process built around a continuous cycle of evaluation, learning, and improvement over time.

To accommodate this continuous cycle and to track management actions and mitigation application, within 90 days of the signature of this ROD, AMC and AETC will develop mitigation plans that identify principal and subordinate organizations having responsibility for oversight and execution of specific mitigation and management actions. In no case will an impact-inducing action be taken or implemented, prior to the applicable mitigation (defined below) being put in place.

The plans will include, but not be limited to, the following:

- Identification of the specific actions;
- Identification of the responsible organization for each action;
- Timing for execution of the actions, and;
- Definition of the adaptive management approach to be used.

Within certain parameters, the USAF may develop an adaptive management program as part of its overarching mitigation and monitoring program[1]. In doing so, the USAF would follow the President's Council on Environmental Quality mitigation and monitoring guidance[2] and other legal and generally accepted practices.

Furthermore, the USAF intent is to provide flexibility in its adaptive management approach in order to comply with regulatory requirements and allow for considered adaptations. Where the proposed use of adaptations are considered, the USAF will, before adapting, fully consider whether or not the adaptation triggers the need for more full analysis under NEPA and the USAF's EIAP (e.g., supplementation, tiering, etc.).

Management Actions

The USAF has required the KC-46 to meet FAA Part 36, Stage 4 noise levels (the most restrictive commercial aircraft noise level standard) and International Congress of Aeronautical Organizations, Committee of Environmental Protection (CAEP)/6 air contaminant emission limits (FEIS, pages 1-4 to 1-5, §1.4.2).

As described in the FEIS (Volume I, Pages 4-1 to 4-123), management actions applicable to both Altus AFB for the FTU mission and McConnell AFB for the MOB 1 mission are listed below by each of the FEIS resource areas.

Noise

In Table 2-23 on page 2-68 in the FEIS, the 2nd bullet under Altus FTU Noise should reflect 20 percent rather than 10 percent total airfield operations between 10:00 PM and 7:00 AM.

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[1] In furtherance of NEPA's Section 101 goals to "protect, restore, and enhance the environment" (40 Code of Federal Regulations [CFR] 1500.1(c))

[2] "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact," January 14, 2011

Table 2-23 on page 2-68 in the FEIS, the McConnell FTU discussion should include a bullet reading "KC-46 aircrews would conduct about 20 percent of total airfield operations between 10:00 P.M. and 7:00 A.M."

Altus AFB FTU Mission

- KC-46A operations will mirror existing tanker operations making use of traffic patterns to the east and west of Altus AFB (FEIS, Volume I, pages 4-1 to 4-2, §4.1.1).
- The KC-46A will be operated at the same auxiliary airfields currently used by Altus based KC-135 aircraft and at about the same frequency. The KC-46A will use the same flight routes to access the auxiliary airfields and will operate on the same flight tracks that are used by the KC-135 aircraft and at about the same frequency.
- Auxiliary airfields will generally not be used by the KC-46A between 10:00 PM and 7:00 AM (FEIS, Volume I, page 4-5, §4.1.1).
- Approximately 20 percent of the total KC-46A operations will be flown between 10:00 PM and 7:00 AM. (FEIS, Volume I, page 4-2, §4.1.1).

McConnell AFB MOB 1

- KC-46A operations will mirror existing tanker operations making use of existing traffic patterns (FEIS, Volume 1, page 4-89, §4.4.1).
- KC-46A will limit night time operations (between 10:00 PM and 7:00 AM) to 10 percent of total airfield operations (FEIS, Volume I, page 4-89, §4.4.1).

Air Quality

- Employ fugitive dust control and soil retention practices (FEIS, Volume I, page 4-9, §4.1.2) including:
  - Water trucks to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
  - Minimize the amount of disturbed ground area at a given time.
  - Suspension of all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site.
  - Designating personnel to monitor the dust control program and to order increased watering, as necessary, to minimize the generation of dust.

Safety

- Existing KC-135 emergency fuel jettison locations and procedures will be used for all KC-46A missions (FEIS, Volume I, page 2-9, §2.3.1.4 and page 2-11, §2.3.2.4; page 3-8, §3.1.31, and page 3-68, §3.4.3.1; Volume II, pages B-14 and B-15, §B.3.3.1).
- Emergency and mishap response plans for both installations will be updated to address the needed procedures and response actions specific to the KC-46A airframe (FEIS, Volume I, page 4-16, §4.1.3.1.2, and page 4-100, §4.4.3.2.2).

Soils and Water

- Update installation Storm Water Pollution Prevention Plans at both installations to reflect new KC-46A building construction as required by state and federal Clean Water Act requirements (FEIS, Volume I, page 4-17, §4.1.4.1 and page 4-102, §4.4.4.2).
    - Silt fence, interceptor trenches, hay bales, or other suitable erosion and sediment control measures will be used during construction. At the completion of construction, re-vegetation of disturbed areas will occur as soon as practical (FEIS, Volume I, pages 4-17, 4-24 and 4-102, §4.1.4.1 and §4.4.4.2).
    - After construction, all disturbed areas will be re-graded to pre-construction contours (FEIS, Volume I, pages 4-17, 4-24, 4-55, 4-75, 4-79 and 4-102, 4-109, 4-111 §4.1.4.1, §4.1.8.1.3, §4.1.8.3.3, §4.2.8.3, §4.3.5.4, §4.3.8.3 and §4.4.4.2, §4.4.8.1.3, §4.4.8.2.3).

McConnell AFB MOB 1 Mission

- Continue best management practices[3] to reduce stormwater runoff containing deicing fluid. These will include monitoring, inspection, and replacement of valves, and flushing of deicing system prior to opening diversion valves (FEIS, Volume I, page 4-101, §4.4.4.2).
- The proposed addition to Building 1220 is located in a 100-year floodplain. To the maximum extent practical, work in the 100-year floodplain would be minimized (FEIS, Volume I, page 4-102, §4.4.4.2) (See FONPA page 9 of ROD).
- The proposed addition to Building 1220 will be constructed above the base flood level (FEIS, Volume I, page 4-103, §4.4.4.2).

Biological Resources

- Continue adherence to Bird/Wildlife Aircraft Strike Hazard program (FEIS, Volume I, pages 4-19 and 4-104, §4.1.5.1.2 and §4.4.5.2.2).

Cultural Resources

- Track results of government-to-government consultation with tribes (FEIS, Volume I, page 2-69).
- In the case of unanticipated or inadvertent cultural resources discoveries, the USAF would comply with Section 106 of the NHPA and follow the standard operating procedures outlined in the Integrated Cultural Resource Management Plan (ICRMP) (FEIS, Volume I, pages 4-20 and 4-106, §4.1.6.1 and §4.4.6.2).

Infrastructure

- Incorporate Leadership in Energy and Environmental Design (LEED) and sustainable development concepts into construction projects to achieve optimum resource efficiency, sustainability, and energy conservation, except to the extent limited or prohibited by law (FEIS, Volume I, page 2-4, §2.3).

[3] 32 CFR §989.22(a)

- Continue and enhance recycling and reuse programs to accommodate waste generated by the KC-46A beddown (FEIS, Volume I, pages 4-25 and 4-112, §4.1.8.1.6 and §4.4.8.2.6).

Hazardous Materials and Waste

- Update Hazardous Waste Management Plans at both installations to account for any new and/or changed waste streams or new procedures, if any, for managing hazardous materials and wastes associated with KC-46A aircraft (FEIS, Volume 1, page 2-70, Table 2-23).

Socioeconomics

- Complete Housing Requirements and Market Analyses (HRMA) at both installations (FEIS, Volume I, page 2-61, Table 2-21).

Mitigation

McConnell AFB MOB 1 Mission

- McConnell AFB has signed a Memorandum of Agreement (MOA) with the SHPO regarding the demolition of Building 1106 (FEIS, Volume II, Appendix A, pages A.5-35 to A.5-38).

<u>Mitigation for Demolition of Building 1106</u>

- McConnell AFB will provide materials for interpretive use by the Kansas Aviation Museum. The materials may be photos, drawings, and/or historic summaries related to aviation at McConnell AFB. McConnell AFB is willing to provide these materials, which the Museum has expressed interest in displaying. Upon submittal of the full package, and receipt by the Museum, the materials become property of the Museum.

- McConnell AFB will provide cultural resources-related materials to the Wichita State University Libraries (the Library), Special Collections and University Archives, Wichita, Kansas; the SHPO will receive electronic copies of the materials. The source of materials is McConnell AFB Historic Records files and includes, but is not limited to, documents, photos, and/or drawings related to cultural resources at McConnell AFB.

- McConnell AFB will ensure production of a "web page" suitable for internet posting, and a brochure useful for general distribution/accessibility to educate non-technical audiences within and beyond McConnell AFB. These products will focus on McConnell AFB's history in general, and will also incorporate historic buildings and their pertinent immediate and broader settings.

<u>Preservation of Buildings 1107 and 1218</u>

- McConnell AFB will ensure all phases of design, construction, and maintenance/operation of the buildings follow applicable provisions of "The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings" ("Standards") (36 CFR Part 68).

- McConnell AFB will provide opportunities for the SHPO to review and comment on key steps of MOB 1-related design for the buildings.

- McConnell AFB will require all parties, including contractors, involved with design, construction, and maintenance/operation of the buildings follow the Standards.

- McConnell AFB will ensure standards are met where an individual or team involved in the buildings' design, construction, and maintenance/operation reasonably would be expected to meet professional standards associated with the Standards, McConnell AFB will ensure such standards are met.

Although the USAF considered and adopted all practicable means to avoid or minimize environmental harm at both installations potential impacts that could occur and cannot be mitigated include (but may not be limited to) the following (FEIS Volume I, page 2-67, §2.10, et seq.):

- Altus will experience an increase in the number of acres and estimated number of residents exposed to noise levels equal to or greater than 65 dB DNL.
- The existing capacity of regional landfills would be reduced due to the solid waste generated.
- Hazardous and nonhazardous waste would be generated as a result of maintenance functions associated with the new aircraft.
- Stormwater runoff and associated erosion may increase due to construction.
- There is potential for an increase in the number of bird/wildlife-aircraft strikes and aircraft mishaps resulting from the increased number of annual operations.

Finding of No Practical Alternative:

Implementation of the MOB 1 mission at McConnell AFB includes a proposed addition to Building 1220 for the storage of mobility bags. Storage of these bags must be in close proximity to the mobility ramp because they are loaded on aircraft during troop deployments. The existing foundation of Building 1220 is located adjacent to a 100-year floodplain on McConnell AFB.

Factors considered when siting the mobility bag storage area included environmental opportunities/constraints (e.g., noise, floodplain, land use compatibility, threatened and endangered species, historic preservation, cultural resources, and airfield surfaces). Facility requirements and utility availability, Anti-Terrorism/Force Protection (AT/FP) criteria, and the functional relationship to other facilities for energy savings potential, parking, size/massing, and aesthetics were also considered. The factors considered regarding the proposed addition to Building 1220 are discussed in FEIS Volume I, page 4-102, §4.4.4.2.

Building 1220, which serves as the existing mobility bag storage, was the only facility considered suitable to partially meet this storage requirement. This facility would require an 8,000-square-foot addition on the south side and within the floodplain to accommodate this need. The USAF considered an alternate location on the west side of Building 1220 in an area outside of the floodplain. However, construction on this side of Building 1220 would impact a main utility trunk line serving the airfield control tower and the entire Kansas Air National Guard (KANG) complex located on the opposite side of the flightline from Building 1220. The trunk line contains approximately 400 pairs of copper cabling and over 200 fiber optic strands. Construction is not possible over the top of the trunk line, and relocating the trunk line would cost over $1 million; therefore, construction at this location is considered cost prohibitive. The alternatives considered to avoid effects and incompatible development regarding the proposed

mobility bag storage area project at Building 1220 are discussed in FEIS Volume I, page 4-102, §4.4.4.2.

Therefore, pursuant to Executive Order 11988 (Floodplain Management) and considering all supporting information, I find that there is no practicable alternative to the Building 1220 addition being sited in areas within the 100-year floodplain as described above and in the FEIS. The FEIS identifies all practicable measures to minimize harm to the existing environment.

Decision

The USAF will, by this decision, beddown up to eight (8) KC-46A Primary Aerospace Vehicles Authorized (PAA) under Air Education and Training Command (AETC) for the FTU and thirty-six (36) PAA under Air Mobility Command (AMC) for the MOB 1. For the FTU, of the two alternative basing locations considered in the FEIS (Altus AFB, OK, and McConnell AFB, KS), the USAF has decided to base the KC-46A with associated construction at Altus AFB to accommodate aircraft anticipated to start arriving in 2016. For the MOB 1, of the four alternative basing locations considered in the FEIS (Altus AFB, OK; Fairchild AFB, WA; Grand Forks AFB, ND; McConnell AFB, KS), the USAF has decided to base the KC-46A with associated construction at McConnell AFB to accommodate aircraft anticipated to start arriving in 2016. The first KC-46A aircraft anticipated to arrive at the MOB 1 base will undergo Initial Operational Test and Evaluation (IOT&E). Existing KC-135 aircraft will be replaced as the new KC-46A aircraft enter the USAF inventory.

Kathleen I. Ferguson — 4/22/2014

KATHLEEN I. FERGUSON, P.E. — (Date)
Principal Deputy Assistant Secretary
Performing Duties as Assistant Secretary of the Air Force
Installations, Environment and Logistics

Privacy Advisory

Any personal information provided throughout this process has been used only to identify individuals' desire to make a statement during the public comment period or to fulfill requests for copies of the Final EIS or associated documents. Private addresses were compiled to develop a mailing list for those requesting copies of the Final EIS.

COVER SHEET

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
KC-46A FORMAL TRAINING UNIT AND FIRST MAIN OPERATING BASE BEDDOWN

a. **Responsible Agency:** United States Air Force (USAF)

b. **Report Designation:** Final Environmental Impact Statement (EIS)

c. **Inquiries:** For further information on this Final EIS, contact Ms. Jean Reynolds, AFCEC/CZN, Bldg 171, 2261 Hughes Ave, Ste 155, Lackland AFB, TX 78236-9853.

d. **Proposed Action:** Establish the KC-46A Formal Training Unit (FTU) and First Main Operating Base (MOB 1). The FTU mission includes the basing of up to eight KC-46A aircraft, facilities and infrastructure and manpower to support one training squadron at one active duty Continental United States (CONUS) Air Force Base (AFB). The purpose of the FTU is to effectively train crew and support personnel to operate the KC-46A aircraft. The MOB 1 mission includes the basing of 36 KC-46A aircraft, facilities and infrastructure and manpower to support three squadrons of 12 KC-46A aircraft at one active duty CONUS AFB. The purpose of MOB 1 mission is to provide a fully capable, combat operational KC-46A aerial refueling force to accomplish aerial refueling and related missions.

e. **Alternatives**: The Strategic Basing Process resulted in the identification of Altus AFB in Oklahoma and McConnell AFB in Kansas as alternative bases for consideration for the KC-46A FTU mission and the identification of Altus AFB, Fairchild AFB in Washington, Grand Forks AFB in North Dakota, and McConnell AFB as alternative bases for the MOB 1 mission. Although Altus AFB and McConnell AFB were identified as alternative bases for both the FTU and MOB 1 missions, no base would be selected to host both missions because of the inherent conflicts and capacity issues associated with beddown of both training and operations squadrons at a single base. The USAF's preferred alternatives for the FTU and MOB 1 missions respectively are Altus AFB and McConnell AFB. The reasonable alternatives for the MOB 1 mission are Fairchild AFB and Grand Forks AFB.

f. **Abstract:** This EIS was prepared by the USAF in accordance with the National Environmental Policy Act of 1969 (42 United States Code [U.S.C.] 4321 et seq.), as implemented by the Council on Environmental Quality regulations (40 *Code of Federal Regulations* [CFR] 1500–1508), and Air Force Instruction (AFI) 32-7061, The Environmental Impact Analysis Process (as promulgated in 32 CFR 989).The USAF has prepared this EIS to assess the potential environmental consequences associated with the implementation of the KC-46A FTU and MOB 1 missions. The USAF selected the FTU and MOB 1 bases using operational analysis, the results of site surveys, and military judgment factors. Resources addressed in the EIS include noise, air quality, safety, soils and water, biological resources, cultural resources, land use, infrastructure, hazardous materials and waste, socioeconomics, and environmental justice and the protection of children.

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VOLUME II – APPENDICES

BACK COVER

*CD-ROM Appendix A and Appendix D are included on CD-ROM on the back cover of this document.

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ACRONYMS AND ABBREVIATIONS

ABW	Air Base Wing
ACC	Air Combat Command
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ADSL	average daily student load
AETC	Air Education and Training Command
AF	Air Force
AFB	Air Force Base
AFE	Aircrew Flight Equipment
AFH	Air Force Handbook
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health
AFRC	Air Force Reserve Command
AFW	Fort Worth Alliance Airport
AGE	aerospace ground equipment
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
AMA	Rick Husband Amarillo International Airport
AMC	Air Mobility Command
AME	Alternate Mission Equipment
AMTS	Air Mobility Training Squadron
AMU	Aircraft Maintenance Unit
AMW	Air Mobility Wing
ANG	Air National Guard
ANGS	Air National Guard Station
AOZ	airport overlay zone
APZ	accident potential zone
AR	air refueling
ARG	Air Refueling Group
ARW	Air Refueling Wing
AST	aboveground storage tank
AT/FP	Anti-Terrorism/Force Protection
BAM	Bird Avoidance Model
BASH	Bird/Wildlife-Aircraft Strike Hazard
bgs	below ground surface
BGEPA	Bald and Golden Eagle Protection Act
BIA	Bureau of Indian Affairs
BIA EIS	West Plains Casino and Mixed-Use Development Project EIS
BMW	Bombardment Wing
BO	boom operator
BO-PTT	Boom Operator Part Task Trainer
BOD	biological oxygen demand
BOS	Base Operating Support
BOT	Boom Operator Trainer
BRAC	Base Realignment and Closure

ACRONYMS AND ABBREVIATIONS (Continued)

C&D	construction and demolition
C2	Command and Control
CAA	Clean Air Act
CATEX	Categorical Exclusion
CDC	child development center
CDR	Construction, Demolition & Recycle
CE	Civil Engineering
CEMP	Comprehensive Emergency Management Plan
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CONUS	Continental United States
CSM	Clinton-Sherman Industrial Airpark
CWA	Clean Water Act
CY	calendar year
CZ	clear zone
DAHP	Department of Archaeology and Historic Preservation
dB	decibel(s)
DHS	Department of Homeland Security
DNL	day-night average sound level
DoD	U.S. Department of Defense
DODI	Department of Defense Instruction
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act of 2007
EO	Executive Order
EOD	explosive ordnance disposal
ERP	Environmental Restoration Program
FAA	Federal Aviation Administration
FICUN	Federal Interagency Committee on Urban Noise
FOE	Forbes Field
FONPA	Finding of No Practicable Alternative
FRP	Facility Response Plan
FTC	Flight Training Center
FTU	Formal Training Unit
FuT	Fuselage Trainer
FY	fiscal year
GHG	greenhouse gases
GIS	geographic information system
GMV	government motor vehicle
GOCESS	Government-Operated Civil Engineer Supply Store
GP	General Plan

ACRONYMS AND ABBREVIATIONS (Continued)

GPD	gallons per day
GPEA	General Plan Environmental Assessment
GPM	gallons per minute
GWMU	Ground Water Monitoring Unit
GWP	global warming potential
HAP	hazardous air pollutant
HAZMART	Hazardous Materials Pharmacy
HMMP	Hazardous Materials Management Plan
HRMA	Housing Requirements and Market Analysis
HVAC	heating, ventilation, and air conditioning
HWMP	Hazardous Waste Management Plan
I-	Interstate
I&I	Inflow and Infiltration
ICP	Integrated Contingency Plan
ICRMP	Integrated Cultural Resource Management Plan
ICT	Wichita Mid-Continent Airport
IDP	Installation Development Plan
IICEP	Interagency/Intergovernmental Coordination for Environmental Planning
ILS	Instrument Landing System
IMPLAN	Impact Analysis for Planning
INRMP	Integrated Natural Resource Management Plan
IOT&E	Initial Operational Test and Evaluation
IW	Intelligence Wing
JAA	Jet-A (with additives)
JLUS	Joint Land Use Study
JPRA	Joint Personnel Recovery Agency
KANG	Kansas Air National Guard
KAXS	Altus-Quartz Mountain Regional Airport
KDHE	Kansas Department of Health and Environment
KV	kilovolt(s)
KWH	kilowatt hour(s)
LBB	Lubbock Preston Smith International Airport
LBP	lead-based paint
LEED	Leadership in Energy and Environmental Design
LOA	Letter of Agreement
LQG	large-quantity generator
MAJCOM	Major Command
MBTA	Migratory Bird Treaty Act
Mcf	thousand cubic feet
MGD	million gallons per day
MILCON	military construction
MMcf	million cubic feet
MOA	Memorandum of Agreement
MOB 1	First Main Operating Base
MOB 2	Second Main Operating Base
MSL	mean sea level
MTF	Maintenance Training Facility

ACRONYMS AND ABBREVIATIONS (Continued)

MWH	megawatt hours
NAAQS	National Ambient Air Quality Standards
NAVAIDS	Airfield Navigational Aid System
NDAAQS	North Dakota Ambient Air Quality Standards
NDDH	North Dakota Department of Health
NDNHP	North Dakota Natural Heritage Program
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NIPTS	noise-induced permanent threshold shift
NO_2	nitrogen dioxide
NOA	notice of availability
NOI	notice of intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NVG	night vision goggles
NVIS	Night Vision Imaging System
NWR	National Wildlife Refuge
O&M	operations and maintenance
O_3	ozone
ODEQ	Oklahoma Department of Environmental Quality
ODS	ozone depleting substance
OSHA	Occupational Safety and Health Administration
OWS	oil-water separator
P2	Pollution Prevention
PAA	Primary Aerospace Vehicles Authorized
PCB	polychlorinated biphenyl
PDA	Potential Development Alternative
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POV	privately owned vehicle
ppm	parts per million
P-PTT	Pilot Part Task Trainer
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
RAPCON	Radar Approach Control
ROD	Record of Decision
ROI	region of influence
RPA	remotely piloted aircraft
RPWRF	Riverside Park and Water Reclamation Facility
SAC	Strategic Air Command
SecAF	Secretary of the Air Force
SEL	sound exposure level
SERE	Survival, Evasion, Resistance, and Escape
SHPO	State Historic Preservation Office
SIP	State Implementation Plan

ACRONYMS AND ABBREVIATIONS (Continued)

SO_2	sulfur dioxide
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasures
SQG	small-quantity generator
Squad Ops	Squadron Operations
SRCAA	Spokane Regional Clean Air Agency
STA	Sikorsky Training Academy
STRACNET	Strategic Rail Corridor Network
SUA	Special Use Airspace
SWPPP	Storm Water Pollution Prevention Plan
TACAN	Tactical Air Navigation
TCE	trichloroethylene
TFI	Total Force Integration
TSCA	Toxic Substances Control Act
TTS	Temporary Threshold Shift
U.S.C.	*United States Code*
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USEIA	U.S. Energy Information Administration
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound
WAAQS	Washington Ambient Air Quality Standards
WANG	Washington Air National Guard
WIC	Weapons Instructor Course
WST	Weapon System Trainer
WWTP	Wastewater Treatment Plant

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CHAPTER 1

PURPOSE AND NEED FOR KC-46A FORMAL TRAINING UNIT AND FIRST MAIN OPERATING BASE BEDDOWN

1.0 PURPOSE AND NEED FOR KC-46A FORMAL TRAINING UNIT AND FIRST MAIN OPERATING BASE BEDDOWN

The United States (U.S.) Congress authorized and appropriated funds supporting the U.S. Air Force's (USAF's) selection of the KC-46A as the newest aerial refueling aircraft to replace a portion of the aging fleet of KC-135 Stratotankers. Beginning in 2012, the deployment of new USAF aircraft and missions must follow Air Force Instruction (AFI) 10-503, "Strategic Basing." Per this AFI, the USAF must perform an enterprise-wide evaluation of Air Force Bases (AFBs) that could be considered as basing locations for the KC-46A.

This Final Environmental Impact Statement (EIS) has been prepared to provide the decision maker and the public the information required to understand the future potential impacts of the decisions that may be made regarding beddown of the Formal Training Unit (FTU) and the First Main Operating Base (MOB 1) missions for the KC-46A.

This Final EIS analyzes USAF proposals to beddown the FTU and the MOB 1 missions for the KC-46A at active-duty AFBs in the continental United States (CONUS). The FTU action would include the basing of up to eight Primary Aerospace Vehicles Authorized (PAA) under Air Education and Training Command (AETC), and the MOB 1 action would include the basing of 36 PAA under Air Mobility Command (AMC). The first four KC-46A aircraft will arrive at the MOB 1 base in 2016 to undergo Initial Operational Test and Evaluation (IOT&E). During IOT&E, which will only occur at the MOB 1, aircraft will begin arriving at both of the bases selected to host the FTU and MOB 1 missions, with up to eight delivered by 2021 for the FTU mission and 36 delivered by 2019 for the MOB 1 mission.

The USAF used the Strategic Basing Process outlined in AFI 10-503 to identify the alternative bases indicated below. Although individual bases may be considered for both the FTU and MOB 1 missions, no base would be selected to host both missions.

- FTU Scenario Alternative Bases
  - Altus AFB, Oklahoma
  - McConnell AFB, Kansas
- MOB 1 Scenario Alternative Bases
  - Altus AFB, Oklahoma
  - Fairchild AFB, Washington
  - Grand Forks AFB, North Dakota
  - McConnell AFB, Kansas

The KC-46A will provide decades of mission support from the First Main Operating Base (MOB 1) and a Formal Training Unit (FTU).

Basing actions for the KC-46A mission would follow the 2008 Secretary of Defense Total Force Integration (TFI) policy concept. This policy was enacted into law through the passage of the 2008 National Defense Authorization Act. TFI associations pair two USAF component units (host and associate) together to operate as one. The host unit is assigned responsibility of the physical resources for accomplishing a mission (aircraft, equipment, facilities) and the associate unit shares those resources. Currently, there are three types of TFI associations: classic, active, and Air Reserve Component.

The KC-46A FTU and MOB 1 missions will utilize the classic association of crews. Per AFI 90-1001, "Responsibilities for Total Force Integration," classic associations pair active-duty host units with a reserve component associate unit to improve operational synergies and add capacity during surge operations at a reduced cost.

For over 50 years, the KC-135 served as the aerial refueling backbone to project global reach and combat power. The new KC-46A will provide updated technology designed to enhance operations and increase mission effectiveness to support USAF, Navy, Marine Corps, and allies who rely on tanker range and flexibility to strengthen the coalition mission.

AMC is the lead Major Command (MAJCOM) responsible for maintaining the air mobility mission, including command and control (C2) of airlift and aerial refueling. AMC will operate the MOB 1 mission with fully trained combat aircrews providing aerial refueling and mission support for regional conflicts, conventional global strike, and nuclear deterrence operations.

Integration of this new aircraft into the USAF inventory requires trained aircrews (pilots, copilots, boom operators [BOs], and support personnel). AETC is the MAJCOM responsible for training KC-46A pilots, copilots, BOs, and support personnel at the FTU base. In addition, personnel will be trained to support the new C2 core function that will have the capability to provide connectivity among tactical network partners.

The USAF will accommodate growth in understanding the KC-46A program by incorporating an adaptive management approach. Training and operational understanding of the KC-46A weapons system will evolve as the aircraft are integrated into the USAF inventory. As program understanding and requirements mature, adaptive management will allow for continuous improvement in the management effectiveness and reduction of environmental impacts.

The National Guard Bureau is preparing a separate EIS that will support an independent decision to beddown 12 KC-46A aircraft at a Second Main Operating Base (MOB 2), to be operated by the Air National Guard (ANG). The locations being considered for MOB 2 include Forbes Field (FOE), Kansas; Joint Base McGuire-Dix-Lakehurst, New Jersey; Pease Air National Guard Station, New Hampshire; Pittsburgh Airport, Pennsylvania; and Rickenbacker Air National Guard Base, Ohio. This action is separate and independent from the FTU and MOB 1 decisions that will result from this Final EIS. Following the first two beddown actions, the USAF will plan additional beddown actions for the remaining KC-46A aircraft.

1.1 PURPOSE OF THE FORMAL TRAINING UNIT AND FIRST MAIN OPERATING BASE BASING

The proposed actions to establish the FTU and MOB 1 are intended to (1) effectively train required crew and support personnel at the FTU and (2) provide a fully capable, combat operational KC-46A aerial refueling force at the MOB 1 to accomplish aerial refueling and related missions.

The mission-ready KC-46A squadrons will allow immediate and effective employment in exercises, peace-keeping operations, contingencies, and combat. Bedding down and operating the KC-46A will allow the USAF to maintain combat capability and mission readiness as U.S. military resources become increasingly committed to missions throughout the world.

1.2 NEED FOR THE FORMAL TRAINING UNIT AND FIRST MAIN OPERATING BASE BASING

The KC-46A FTU and MOB 1 beddowns are needed to support the recapitalization of the USAF's aging refueling aircraft fleet. The USAF needs bases to accomplish the required training and to field a fully operational force. FTU and MOB 1 bases are needed to achieve a high state of operational mission readiness. The effective training and qualification of crewmembers and support personnel at the FTU will transition initially to mission-ready MOB 1 KC-46A squadrons.

The basing locations will require facilities, infrastructure, and airspace where KC-46A aircraft can be located with the capability for crews and aircraft to perform all the activities and training necessary to maintain a robust aerial refueling capability for the USAF and other U.S. Department of Defense (DoD) branches as legacy KC-135 tankers are withdrawn from the inventory.

1.3 BACKGROUND FOR MEETING THE PURPOSE AND NEED

In April 2006, the USAF completed an Analysis of Alternatives to determine the most appropriate strategy to recapitalize the existing KC-135 aircraft fleet. Based on this analysis, the USAF concluded that a commercial derivative replacement tanker would result in the best value. Although Section 1.4.2 details the technological improvements of the KC-46A, the following points are examples of capabilities that are currently lacking or are very limited with the existing KC-135 fleet.

- **Receiver Capable.** The ability to receive fuel from other tanker aircraft is considered a force multiplier. Currently, this capability is only available on a small number of KC-135 aircraft. This lack of capability limits persistence over the battlefield and results in inefficient use of aerial refueling assets
- **Night Vision Imaging System (NVIS).** The fleet lacks a standard NVIS for tanker cockpits and BOs. External aircraft lighting is currently not NVIS-compatible. The lack of this capability degrades effectiveness for special operations support and limits the use of these aircraft for covert operations
- **Multi-point Refueling.** Only a small number of KC-135 aircraft are equipped for simultaneous multi-point refueling. The lack of this capability severely limits the aircraft’s functionality to support multiple simultaneous refueling operations, as well as boom and drogue refueling on the same mission
- **Command and Control (C2) Network.** Lacks connectivity to C2 assets and aircraft have no secure tactical datalink and limited connectivity to other combat support and mobility aircraft
- **Defensive Protection.** Not normally equipped with aircraft defensive systems, which limits aircraft from operating in anything other than a low-threat environment

Congressional authority funded a total aircraft inventory of up to 179 KC-46A aircraft by 2028 to correct deficiencies, update the fleet, enhance operations, and increase mission effectiveness. Most of the total aircraft inventory will be assigned to combat units but would be operated by units assigned to AMC, U.S. Air Force in Europe, Pacific Air Forces, ANG, and Air Force Reserve Command (AFRC).

1.4 AIRCRAFT CHARACTERISTICS

This section compares the aircraft characteristics of the KC-46A and the existing KC-135. Some key specifications of the KC-135 and the KC-46A are compared in Table 1-1.

Table 1-1. Aircraft Comparison

Specification	KC-135	KC-46A
Length	136 feet, 3 inches	165 feet, 6 inches
Height	41 feet, 8 inches	52 feet, 10 inches
Wingspan	130 feet, 10 inches	156 feet, 1 inch
Power Plant	4 F108-CF-100	2 Pratt Whitney 4062

Table 1-1. Aircraft Comparison (Continued)

Specification	KC-135	KC-46A
Takeoff Thrust	21,634 pounds per engine	62,000 pounds per engine
Speed	530 miles per hour (mph) at 30,000 feet	530 mph at 30,000 feet
Ceiling	50,000 feet	40,100 feet
Maximum Takeoff Weight	322,500 pounds	415,000 pounds
Maximum Fuel Capacity	200,000 pounds	212,000 pounds
Pallets/Palletized Cargo Weight Capacity	6/36,000 pounds	18/65,000 pounds
Crew	3 crewmembers	3 crewmembers
Receiver Fuel Transfer	Very limited	Yes
Fuel Jettison	Yes	Yes
NVIS	No	Yes
Multi-point Refueling	Very limited	Yes
C2 Network	No	Yes
Defensive Protection	Very limited	Yes
Aeromedical Evacuation	Limited	Yes

1.4.1 Aircraft Characteristics of the KC-135

The KC-135 Stratotanker was developed in 1954 as the USAF's first jet-powered refueling tanker to replace the KC-97 Stratotanker and is derived from a commercial Boeing 367-80 commercial passenger plane. Between 1956 and 1966, 820 KC-135 aircraft of many different variations were built. Over the last 50 years, the KC-135 fleet has undergone substantial modifications to add capability. The KC-135 was originally developed to refuel strategic bombers. It was used in the Vietnam War and in all conflicts up to and including Operation Enduring Freedom in Afghanistan. For this Final EIS, all KC-135 models, including the current R model, are referred to as KC-135. Originally all KC-135s were equipped with four Pratt & Whitney J-57-P-59W turbojet engines capable of producing approximately 13,000 pounds of thrust each. The current R models were upgraded to use the CFM56-2B1 (Military designation F108-CF-100) turbofan engines, which are capable of generating approximately 21,634 pounds of thrust per engine. The KC-135 has a maximum takeoff weight of more than 322,500 pounds and the ability to off-load in excess of 150,000 pounds of fuel. In addition, the KC-135 is capable of transporting up to 36,000 pounds of palletized cargo and/or ambulatory patients during aeromedical evacuations. A cargo deck above the refueling system can hold a mixed load of passengers and cargo depending on the fuel storage configuration. The KC-135 pumps fuel through the flying boom, but some aircraft have been specially fitted with wing pods to allow a multi-point aerial refueling drogue system. As noted previously, the aircraft is limited by not possessing the capability for receiver fuel transfer, NVIS, defense protection, and C2 capabilities.


KC-135

1.4.2 Aircraft Characteristics of the KC-46A

The KC-46A is derived from a commercial Boeing 767-200ER series aircraft and will be powered by two Pratt & Whitney 4062 engines (thrust reversers removed). Each engine will have the capability to provide approximately 62,000 pounds of thrust. The aircraft will be Federal Aviation Administration (FAA)-certified for worldwide operations. The KC-46A configuration adds the military equipment (e.g., aerial refueling, defensive systems, situational

awareness) and will receive a FAA Supplemental Type Certificate as well as a USAF Military Type Certificate. It is required to meet the FAA Part 36 Stage 4 (most restrictive commercial aircraft noise level standard) and the International Congress of Aeronautical Organizations, Committee of Environmental Protection (CAEP)/6 air contaminant emission limits. Three crewmembers, (pilot, copilot, and BO) will operate the aircraft with permanent seating for an additional 12 aircrew members. With new technology and a maximum fuel capacity expected to be 212,000 pounds, the KC-46A is capable of accomplishing all current AMC refueling missions.

KC-46A

The KC-46A will be able to refuel any certified fixed-wing receiver-capable aircraft on any mission both day and night. The aircraft will be equipped with a modernized KC-10 refueling boom integrated with proven fly-by-wire control system and will have the ability to deliver fuel through a centerline hose and drogue system, which adds additional mission capability independent of the boom system.

This aircraft will be capable of accomplishing multi-role missions. By trading fuel for cargo, it will be able to carry up to 18 standard cargo pallets with a total palletized cargo payload of up to 65,000 pounds. With a far greater cargo area contour than the KC-135, KC-46A centerline pallet positions 1 through 8 can be built to carry full height (96-inch-high) cargo without the need for contouring, compared to KC-135 pallets, which are typically restricted to 65-inch-high cargo and must be contoured on the right-hand side starting at 50 inches off the top pallet surface. In normal operations, the KC-46A can be configured to carry 58 passengers and will be capable of providing urgent Aeromedical Evacuation, transporting up to 50 medical patients (24 litters/26 ambulatory).

Additional features include a flush-mounted air refueling receptacle, wing air refueling pods capability, boom air refueling camera and computer control systems, defensive and communication systems, NVIS/covert lighting, and military radio/navigation receivers. The BO will control the refueling systems from the crew compartment via the Air Refueling Operating Station. A series of cameras mounted on the tanker's fuselage provide a 185-degree field of view under day and night lighting conditions. Imaging may be captured in three-dimensional or two-dimensional high-definition video. Fuel is automatically transferred within the aircraft to maintain center of gravity in all axes. The flow of fuel in, out, and within the aircraft can be manually or automatically controlled by the aircraft and can be manually controlled by the aircrew via control display units at the appropriate duty station.

In addition to fuel and cargo transport, each KC-46A aircraft will possess a secure airborne communications capability, which will provide beyond-the-line-of-sight messaging and line-of-sight tactical datalink multi-modal communications via secure networks. Hosting a suite of network-centric communications equipment, the KC-46A will function with most current C2 systems. The KC-46A will also support the C2 core function as a communications "gateway" when equipped with a roll-on gateway system to provide connectivity between tactical network partners in theater.

This aircraft will have self-defense and protection (both active and passive) capabilities and the necessary operational environment awareness to mitigate threats, but will not be operated in areas of high threats without requesting suppression of enemy air defenses and air support.

This aircraft is capable of ferrying fuel into semi-austere airfields. By following Forward Area Refueling Point procedures, the aircraft can off-load fuel into fuel pits, bladders, trucks, or other

aircraft, with or without the engines running, without the need for special equipment. The aircraft will be able to operate at certain night vision goggle (NVG) and/or defensive system-required airfields with a minimum of 7,000 feet of paved runway available for takeoff/landing.

The aircraft will be capable of operating in day-night and adverse weather conditions over vast distances to enable deployment, employment, sustainment, and redeployment of U.S., joint, allied, and coalition forces.

1.5 PUBLIC AND AGENCY INVOLVEMENT

The primary purpose of the Final EIS is to describe the actions being proposed by the USAF, along with the potential consequences associated with implementation of those actions. Potential impacts associated with implementation of the KC-46A scenarios were evaluated during the planning stages of the project. These potential impacts are presented in this Final EIS. The USAF has evaluated all reasonable alternatives to ensure that informed decisions are made after review and consideration of the potential environmental consequences. The Environmental Impact Analysis Process (EIAP) (32 *Code of Federal Regulations* [CFR] 989) is the process by which the USAF implements the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) NEPA implementing regulations. This Final EIS documents the detailed study of these potential environmental consequences. Compliance with the NEPA process involves several steps to ensure public and agency involvement.

1.5.1 Scoping Process

The public scoping period for the KC-46A FTU and MOB 1 EIS began on 26 March 2013 with publication of the notice of intent in the *Federal Register*. During the following weeks, notification letters were mailed to Federal, state, and local agencies; elected officials; federally recognized tribes (tribes) [1]; nongovernmental organizations; and interested individuals as a part of Interagency/Intergovernmental Coordination for Environmental Planning (IICEP).

IICEP is a federally mandated process for informing and coordinating with other governmental agencies regarding proposed actions. Through the IICEP process, concerned Federal, state, and local agencies are notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action. The USAF determined, through informal consultation with the U.S. Fish and Wildlife Service (USFWS) and state wildlife agencies, that there are no Federal or state threatened or endangered species in the regions of influence (ROIs) of the KC-46A scenarios; therefore, no further consultation was required.

Appendix A, contained in Volume II of this Final EIS, provides sample notification letters, the notification mailing lists, and the comments and concerns received by the USAF during the public scoping period. Newspaper advertisements announcing the intent to prepare a Draft EIS and hold public scoping meetings were published in 10 different local daily and weekly newspapers. These advertisements were published in the weeks preceding each of the scheduled public scoping meetings.

Four public scoping meetings were held between 9 and 18 April 2013 in communities near the four alternative bases (see Table 1-2). The meetings were held in an open house format where citizens could review display boards about the proposed missions and speak individually with USAF personnel. During these meetings, USAF personnel presented information on the

[1] Per Department of Defense Instruction (DoDI) 4710.02, *DoD Interactions with Federally-Recognized Tribes*, “tribe” refers to a federally recognized Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges (DoDI 4710.02, Section 3.5).

proposed action through the use of display boards and fact sheets and answered questions posed by those in attendance.

Table 1-2. KC-46A FTU and MOB 1 Beddown Public Scoping Meetings

Date	Time	Location
9 April 2013	5:00 - 8:00 P.M.	Southwest Technology Center 711 West Tamarack Road; Altus, OK 735213
11 April 2013	5:00 - 8:00 P.M.	Eugene M. Hughes Metropolitan Complex Room 180 5015 E. 29th Street; North Wichita, KS 67260
16 April 2013	5:00 - 8:00 P.M.	The Lincoln Center, Lincoln Ballroom 1316 North Lincoln Street; Spokane, WA 99201
18 April 2013	5:00 - 8:00 P.M.	Grand Forks Ramada Inn 1205 North 43rd Street; Grand Forks, ND 58203

The scoping meetings were attended by 578 people, which included residents, elected officials, local business leaders, military affairs committee members, congressional staffers, base employees, and others. The scoping period closed on 17 May 2013, and approximately 200 comments were received. The majority of the comments were supportive, with only a few requesting certain resource area information to be presented in the Draft EIS.

During scoping, the public and agencies were primarily interested in understanding the operational and economic factors associated with bringing the KC-46A to their base. Some of the comments were related to the proposed action and alternatives and concerns about the environmental consequences, and some expressed support for bringing the KC-46A mission to the local base. Other than the expressions of support, the key issues identified during initial scoping are summarized in Table 1-3.

Table 1-3. Public and Agency Scoping – Summary of Key Issues for KC-46A FTU and MOB 1 Beddown

Issue/Concern/Comment	Base	Concern Expressed by		
		Agency	Public	Tribe
Concern related to impact on National Park Service units	All	X		
Concern related to groundwater plume from USAF operations	Altus		X	
Concern related to the West Pattern and how flying impacts Quartz Mountain Regional Airport	Altus		X	
Comment stating that actions should be taken to prevent surface-water and groundwater contamination	Altus	X		
Recommendation that the USAF provide cultural resource surveys for review	Altus			X
Concern related to undesirable noise from Spokane Airport	Fairchild		X	
Concern related to job impacts on the Spokane area	Fairchild		X	
Concern related to air quality	Fairchild	X		
Concern that noise that could disrupt fasting and tribal prayers	Grand Forks			X
Appeal for the protection of wetlands, water resources from sediment and spills	Grand Forks	X		
Concern about noise effects on a state park	Grand Forks	X		
Suggestion that base traffic should use the gate accessed from U.S. Highway 2 interchange	Grand Forks	X		
Contaminated sites near the base	McConnell	X		
Suggestion that EIS should detail infrastructure necessary and consider Installation Restoration Program sites and the institutional control plan that covers 21 sites	McConnell	X		

Table 1-3. Public and Agency Scoping – Summary of Key Issues for KC-46A FTU and MOB 1 Beddown (Continued)

Issue/Concern/Comment	Base	Concern Expressed by		
		Agency	Public	Tribe
Request for project plans to determine project-specific recommendations	McConnell	X		
Request for cultural resource surveys and National Historic Preservation Act (NHPA) compliance	McConnell			X
Concurrence that Building 1129 may warrant NHPA Section 110 consideration	McConnell	X		

1.5.2 Public Review

The public review period for the KC-46A FTU and MOB 1 Draft EIS was originally planned to begin on 11 October 2013 with publication of the notice of availability (NOA) in the *Federal Register*. Copies of the Draft EIS and associated cover sheets were mailed to Federal, state, and local agencies; elected officials; local libraries; tribes; nongovernmental organizations; and interested individuals. However, because of the government-wide shutdown that occurred from 1 October through 16 October, publication of the NOA in the *Federal Register* did not occur until 25 October 2013. The NOA for the Draft EIS was also published in ten different local newspapers in the communities near the four bases and near the proposed auxiliary airfields (for the FTU mission). Press releases, public service announcements, and postcards were also used to provide notification of availability of the Draft EIS and the dates, times, and locations of the public hearings.

The Draft EIS document was posted on a publicly available website at http://www.KC-46A-Beddown.com. The public review period started on 25 October and ended on 9 December 2013. All comments received during the comment period were considered during preparation of the Final EIS. Comments received are contained in Volume II, Appendix A, Section A.7.3. The USAF only developed responses for substantive comments (Table 6-3).

Generally, substantive comments are regarded as those comments that challenge the analysis, methodologies, or information in the Draft EIS as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or develop and evaluate reasonable alternatives or feasible mitigations not considered by the agency; or that offer specific information that may have a bearing on the decision, such as differences in interpretations of significance or of scientific or technical conclusions. Non-substantive comments, which do not require an agency response, are generally considered those comments that express a conclusion, an opinion, or a vote for or against the proposal itself, or some aspect of it; that state a position for or against a particular alternative; or that otherwise state a personal preference or opinion.

Comments were received through the mail and the website, and were submitted in writing or presented orally at the public hearings. Some of the comments were considered substantive in that they challenged the proposed action and alternatives or expressed concerns about the environmental consequences. Other comments were non-substantive in that they expressed an opinion about the proposal or expressed support for or against bringing the KC-46A mission to the local base.

1.6 TRIBAL CONSULTATION

In an ongoing effort to identify cultural resources or other issues of interest to tribes and as part of the NEPA scoping process, notification letters were submitted to tribes. These letters (see Volume II, Appendix A, Section A.3) were transmitted with a focus on inviting tribes to participate in the NEPA scoping process. Response summaries are reflected in Table 1-3 (see

Volume II, Appendix A, Section A.3, for complete responses). Refer to Table A-1 in Volume II, Appendix A, Section A.3, for a list of the tribes consulted. Also, following the NEPA notification, tribes were contacted separately to initiate National Historic Preservation Act (NHPA) Section 106 consultation (see Volume II, Appendix A, Section A.4, for complete responses). Explanation of the Section 106 consultation is provided for each alternative base in the respective Chapter 3 Cultural Resources section. Following standard USAF practice, consultation was initiated by base commanders who represent key leadership points of contacts for formal government-to-government correspondence. Additional direct communication efforts (phone calls and emails) occurred for tribes that did not respond to USAF mailings. All communications with tribes were completed in accordance with Executive Order (EO) 13175, "Consultation and Coordination with Indian Tribal Governments", Department of Defense Instruction (DoDI) 4710.02, and 36 CFR 800, "Protection of Historic Properties".

To support this EIS, the USAF consulted on a government-to-government basis with the respective tribes attaching historical, cultural, and/or religious significance to lands or sites in the project areas, including but not limited to areas around auxiliary airfields where FTU aircrews would operate.

1.7 ORGANIZATION OF THE ENVIRONMENTAL IMPACT STATEMENT

This Final EIS is designed to analyze the potential environmental impacts associated with the FTU and MOB 1 basing of KC-46A aircraft. The basing will include facilities, personnel, and flight operations at selected bases. The alternative bases are identified in Chapter 2.

Chapter 1 provides information on the purpose and need for the proposed FTU and MOB 1 KC-46A beddown. This section includes an overview of the KC-46A capabilities and explains that the FTU and MOB 1 bases would need to provide facilities, infrastructure, and personnel to assist with KC-46A operations and training. In addition, Chapter 1 addresses public and agency involvement and tribal consultation.

Chapter 2 describes the process for selecting bases and explains the USAF proposed action, the Preferred Alternative for each mission, the reasonable alternatives, and the No Action Alternative. Because the proposed aircraft is the same for the FTU and the MOB 1, this chapter presents general project features applicable to any of the four bases. This chapter also includes a more detailed explanation of requirements for the FTU and the MOB 1 beddowns in terms of base-specific personnel, facility, and operational elements, and lastly describes the project requirements for each base alternative. This chapter also includes a comparison of the potential environmental consequences across the alternatives, a discussion on mitigation measures, and a discussion on unavoidable impacts.

Chapter 3 is organized by each of the four bases and presents the environmental baseline or affected environment at each base selected as alternatives for the FTU or MOB 1 mission.

Chapter 4, also organized by base, presents the analysis of potential environmental impacts associated with implementation of the FTU or MOB 1 mission identified for that base. The analysis in this chapter results from overlaying the mission-specific requirements from Chapter 2 upon the affected environment from Chapter 3 to present the context and intensity of environmental consequences by resource area.

Chapter 5 identifies past, present, and reasonably foreseeable regional projects and describes potential cumulative effects of the proposed beddown in combination with other regional actions at each base. Chapter 5 also identifies irreversible or irretrievable commitments of resources.

Chapter 6 provides a summary of public involvement that has occurred after the release of the Draft EIS. This chapter includes information regarding the public hearings and the USAF responses to substantive comments.

References, contacts made during the EIS development, and a list of the preparers of this EIS, including a summary of their educational accomplishments, are included following Chapter 6.

Volume II contains Appendices A through E, each of which provide supplementary information briefly described below.

Appendix A provides notification letters, notification mailing lists, scoping and public hearing comments and concerns received by the USAF, and correspondence with tribes.

Appendix B describes the environmental resources being considered in this Final EIS, including the applicable regulations, permits, and appropriate agencies involved in the determination of environmental consequences. This appendix also describes the methodology followed for each environmental resource area to evaluate the environmental consequences of basing KC-46A aircraft. The methodology for impact analysis for each resource area, as described in Appendix B, is consistent for each resource area at each of the four bases.

Appendix C includes effects on some specific resources that may not be affected by regularly scheduled KC-46A training operations. Discussion of impacts on a wide variety of resource types provides additional perspective and context for those resources impacted by regular operations. This appendix provides a general noise primer to educate the reader on what constitutes noise, how it is measured, and the studies that were used in support of how and why noise is modeled.

Appendix D includes air quality background information for each of the four bases under consideration for the KC-46A FTU and MOB 1 scenarios. This background information includes regional climate information, along with the spreadsheets used to complete the air quality analysis contained in Chapter 4.

Appendix E summarizes the buildings that would be affected by the KC-46A FTU and MOB 1 beddown-related demolition, renovation, or alteration; their years of construction; and their potential to contain toxic substances (asbestos-containing material [ACM], lead-based paint [LBP], and polychlorinated biphenyls [PCBs]).

CHAPTER 2

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW

This section presents a description of the activities and implementing actions associated with the KC-46A Formal Training Unit (FTU) and First Main Operating Base (MOB 1) missions. The FTU mission involves basing of up to eight Primary Aerospace Vehicles Authorized (PAA) KC-46As in one training squadron to establish the KC-46A FTU at an active-duty continental United States (CONUS) Air Force Base (AFB). The MOB 1 mission involves the basing of 36 KC-46A aircraft in three squadrons of 12 PAA to establish the MOB 1 at an active-duty CONUS AFB. For identified alternatives, this section provides a detailed description of the activities and implementing actions associated with establishing both the KC-46A FTU and MOB 1.

Each squadron requires infrastructure, facilities, airfield operations, training activities, personnel, and airspace to support missions. This section identifies the operational requirements that would be involved at any of the alternative bases.

Table 2-1 provides an overview of key elements associated with the KC-46A FTU or MOB 1 beddown with the potential to affect environmental resources at the base or under the training airspace.

Table 2-1. Overview of KC-46A FTU and MOB 1 Beddown Proposal

The proposal for the KC-46A FTU or MOB 1 beddown involves implementing several related elements at a selected base.

Elements Affecting the Base

- ✓ For the FTU, the beddown of up to eight KC-46A aircraft in one squadron in accordance with the aircraft delivery schedule
- ✓ For MOB 1, the beddown of 36 KC-46A aircraft in three squadrons in accordance with the aircraft delivery schedule
- ✓ Depending on mission, conduct sorties at each base for pilot, copilot, and boom operator (BO) training/certification, aerial refueling operations, and global reach missions
- ✓ Renovate, construct, and manage facilities and infrastructure necessary to support the mission
- ✓ Implement personnel changes (increases or decreases) at the base to conform to mission requirements

Depending on the base and the mission proposed for that base, the proposed action would either add to current missions or replace the current KC-135 mission. Implementation of the proposed action would occur in two stages: a beddown stage and an operational stage. The beddown stage involves construction/retrofit of required facilities, infrastructure, and prepared surfaces, which includes renovation, alteration, and demolition. The beddown stage also includes preparing support facilities for new personnel and students to support the mission. The operational stage involves conducting day-to-day activities (operational missions, maintenance, etc.) of squadrons at the base, including base flight operations, training in the regional airspace, and use of auxiliary airfields.

Section 2.4 provides a detailed description of each of the alternative bases under consideration. The description of each alternative carried forward as a reasonable alternative contains specifics about how the beddown and mission would be implemented at the alternative base and within the regional airspace. In conformance with the Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations* [CFR] 1502.14[d]), this section also describes a No Action Alternative, which consists of not bedding down a KC-46A mission.

2.2 NARROWING PROCESS FOR ALTERNATIVE BASES

The narrowing process used to identify alternatives for the KC-46A FTU and MOB 1 basing locations is described below. The process applied operational and other criteria to identify reasonable alternatives for the beddown of KC-46A FTU and MOB 1 missions.

2.2.1 Alternative Identification Process Methodology

This section describes the U.S. Air Force (USAF) Strategic Basing Process and then describes the application of the Strategic Basing Process to identify KC-46A FTU and MOB 1 scenario basing locations included in this Final Environmental Impact Statement (EIS).

In general, the USAF uses the Strategic Basing Process outlined in Air Force Instruction (AFI) 10-503 to select locations to beddown USAF missions. The process begins by identifying all the bases that could reasonably support a given mission. This enterprise of bases is then evaluated using objective criteria to screen the top candidate bases. Major Command (MAJCOM)-led site surveys are then conducted at each candidate location to determine if the base could reasonably support the mission in question. The Strategic Basing Executive Steering Group oversees the process and reports findings directly to the Secretary of the Air Force (SecAF) and Chief of Staff of the Air Force. This process was mandated by the SecAF to ensure basing decisions were made using a deliberate, repeatable, and standardized process.

In September 2011, Air Mobility Command (AMC) presented the Lead Command Intent for the KC-46A to the SecAF. This Lead Command Intent described the proposed basing action tenets, force structure mix, basing timelines, and the critical information that would be used to shape and inform decisions made throughout the USAF Strategic Basing Process. The following planning conventions were derived from the Lead Command Intent:

1. Identify the number of KC-46A aircraft scheduled to be delivered between 2014 and 2018. This time period corresponded to the U.S. Department of Defense (DoD) Future Years Defense Program, which is the program and financial plan approved by the Secretary of Defense, and provides a basis for USAF planning. Planning beyond this time period is speculative due to the indeterminacy of availability of resources.
2. Identify the number of KC-46A aircraft to be allocated to training and to operations based on then-current national strategic considerations.
3. Determine the number of bases minimally needed to support receipt of these aircraft for training and operations by dividing the amount allocated to training and to operations by the number of squadrons based on two different squadron configurations: one squadron of up to eight PAA for the FTU and three squadrons of 12 PAA each (36 PAA total) for MOB 1 operations. PAA are those aircraft assigned to meet the primary aircraft authorization and reflect the number of aircraft flown by a unit in performance of its mission.
4. Recognize additional factors of Plans and Guidance and Global Positioning, which include strategic considerations but do not provide meaningful distinction among bases for USAF training within the United States and its territories. An additional Logistics Supportability factor equates to Boeing’s support capacity set forth in its contract with the USAF. This factor does not distinguish among bases and is not included in the identification of reasonable FTU and MOB 1 beddown alternatives.

Consideration of the planning conventions above led to an initial screening of all active-duty AFBs against the following standards for the FTU and MOB 1 missions: (1) a runway of at least 7,000 feet in length, (2) the presence of an active-duty wing on the base, and (3) a location in the CONUS. The initial screening yielded a defined enterprise of 54 bases to be evaluated for the FTU and MOB 1 beddowns.

In 2012, AMC presented objective screening criteria to the SecAF. The approved screening criteria were used to screen the enterprise of 54 bases to identify those bases' capacity to successfully support the FTU and MOB 1 missions. The objective criteria included mission, capacity, environmental considerations, and cost and are described in more detail below:

- Mission criteria: For the FTU, proximity to aircraft available to support aerial refueling training, capacity for training and student throughput, existing or space for the required aircrew training system facility and a Fuselage Trainer (FuT) Facility, airfield and airspace availability, fuel system capabilities, and the potential to establish an association to the FTU mission criteria. For the MOB 1, proximity to refueling receiver demand, airfield and airspace availability, fuel system capabilities, and the potential to establish an association to the MOB 1 mission criteria
- Capacity criteria: For the FTU, basic mission facility capacity or space; Base Operating Support (BOS) facilities; base runway length and bearing capacity; available ramp space; squadron operations (Squad Ops) facilities with Aircraft Maintenance Units (AMUs), aircrew, and fuselage training capabilities; and communication infrastructure capacity. For the MOB 1, hangar capacity; runway length and bearing capacity; ramp space; base operation support capacity; Squad Ops facilities with aircraft maintenance units (AMUs); aircrew, maintenance, and fuselage training capabilities; and communications infrastructure
- Environmental criteria: For both the FTU and the MOB 1, meet Clean Air Act (CAA) attainment status, local community's adoption of zoning or other land use controls to reduce encroachment and preserve the base's flying operations, waivers or absence of incompatible development in the clear zone (CZ) and/or accident potential zone (APZ), absence or limited incompatible development within noise contours above 65-decibel (dB) day-night average sound levels (DNL)
- Cost factor criteria: For both the FTU and MOB 1, favorable area construction factor based on DoD facilities Pricing Guide, dated June 2007 (DoD 2007), as updated by the June 2009 draft Office of the Secretary of Defense Pricing Guide (DoD 2009); favorable area locality cost factors

The SecAF considered the objective screening results, as well as subjective operational factors, in determining the candidate bases for the KC-46A FTU and MOB 1 missions. The subjective operational factors, also known as military judgment factors, included the following:

- Plans and Guidance
- Global and Regional Coverage
- Combatant Commander Support
- Total Force
- Beddown Timing
- Force Structure
- Training Requirements and Efficiencies
- Logistic Supportability
- Resources/Budgeting

The Strategic Basing Process described above resulted in the identification of two alternative bases for consideration for the KC-46A FTU mission and four alternative bases for the MOB 1 mission (see Figure 2-1). Although Altus AFB and McConnell AFB were identified as alternative bases for both the FTU and MOB 1 missions, neither base would be selected to host both missions because of the inherent conflicts and capacity issues associated with beddown of both training and operations squadrons at a single base.

- FTU Scenario Alternative Bases
  - Altus AFB, Oklahoma
  - McConnell AFB, Kansas
- MOB 1 Scenario Alternative Bases
  - Altus AFB, Oklahoma
  - Fairchild AFB, Washington
  - Grand Forks AFB, North Dakota
  - McConnell AFB, Kansas

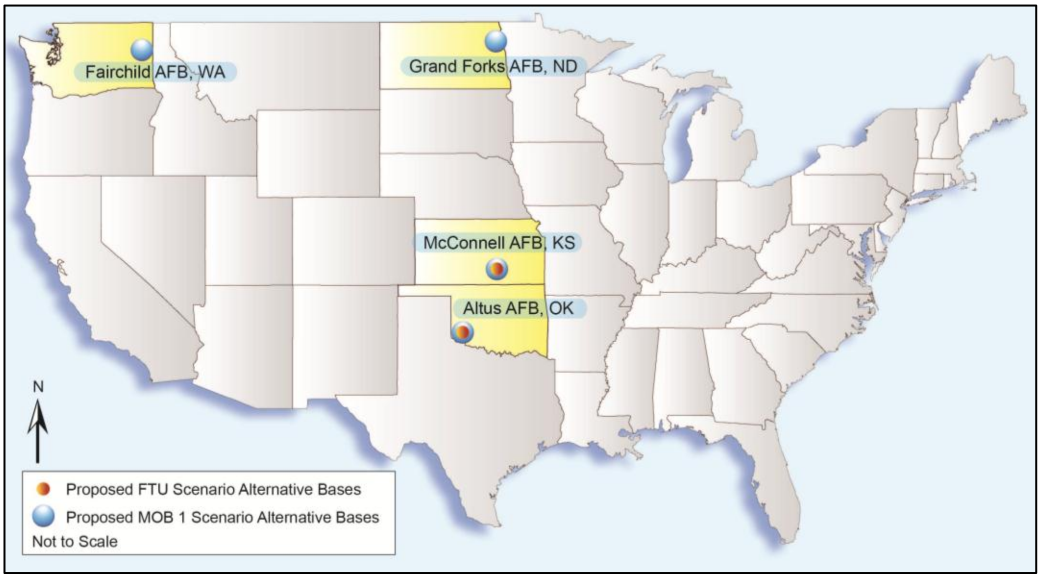


Figure 2-1. Alternative FTU and MOB 1 Basing Locations

2.3 KC-46A MISSION-SPECIFIC REQUIREMENTS

> ***Missions and Scenarios***
> *For the purposes of discussion in this EIS, the words scenario and mission are used interchangeably.*

Although the objective criteria described above specify the general requirements for both the FTU and MOB 1 missions, this section describes the specific details and requirements of each mission. Various factors influence siting of facilities within a developed cantonment area. These factors involve operational functionality, safety, and compliance with regulations and policies (Federal, state, or local). The process of planning the beddown for a new aircraft and mission considers facility requirements that can be partially or wholly fulfilled by existing facilities on the base. The siting process for new construction is iterative, applying factors described below, to identify suitable sites relative to existing space and facilities that provide a reasonable operational efficiency/cost-benefit value. All construction contracts for the FTU and MOB 1 scenarios would require the use of Unified Facilities Criteria (UFC) 3-101-01, Best Management Practices, and attainment of a Leadership in Energy and Environmental Design (LEED) certificate level of silver. Construction

and renovation projects within the 65 dB noise contour would include acoustical design considerations for façade elements and interior design requirements per UFC 3-101-01. Land use should comply with Department of Defense Instruction (DoDI) 4165.57 and Air Force Handbook 32-7084.

As part of the selection process described above, candidate bases were evaluated based on their ability to: (1) provide basic infrastructure and (2) meet the physical mission requirements with existing infrastructure and facilities (with minor renovation or additions and alterations). For this beddown, the USAF intends to use as many existing facilities as possible but recognizes that some new facilities would be required.

In addition to the infrastructure requirements, both the FTU and MOB 1 scenarios have different manpower requirements for the active-duty and reserve or guard component responsibilities. The manpower requirements for each base are different due to the expected aircraft numbers and the different reserve or guard components (Air National Guard [ANG] and Air Force Reserve Command [AFRC]) that apply to each base.

2.3.1 KC-46A FTU Mission-Specific Requirements

The basic requirements for the KC-46A FTU mission include the physical infrastructure, land, air, water, energy assets, and personnel needed to support the training mission. This section describes the requirements necessary for the siting of facilities and infrastructure allocated for mission support functions, personnel authorized to execute work related to the mission, and the flying operations for the assigned FTU base.

2.3.1.1 FTU Facility and Infrastructure Requirements

The basic allocation and physical requirements to support the FTU mission are listed below:

- One (1) General Maintenance/Corrosion Control/Wash Rack Hangar
- One (1) Fuel Cell Maintenance Hangar
- One (1) Squad Ops Facility
- One (1) AMU Facility
- One (1) Flight Training Center (FTC) consisting of:
  - Six (6) Weapon System Trainers (WST)
  - Five (5) Boom Operator Trainers (BOT)
  - Four (4) Pilot Part Task Trainers (P-PTT)
  - Three (3) Boom Operator Part Task Trainers (BO-PTT)
- Two (2) FuTs
- One (1) Maintenance Operations Center
- One (1) Aircrew Flight Equipment (AFE) Facility
- Runway: minimum 147-feet wide by 7,000-feet long with a weight-bearing capability of 415,000 pounds
- Eight (8) parking spots with Fuel Pit Type III Fuel Hydrant System on the parking ramp
- Appropriate fuel supply, storage, and distribution system to support the aircraft
- Radar Approach Control (RAPCON), Instrument Landing System (ILS), Tactical Air Navigation (TACAN) and Airfield Navigational Aid System (NAVAIDS) that can support the KC-46A
- One (1) or more auxiliary airfields to support training activities

- Crash Recovery Shop with adequate vehicle parking
- A variety of shop areas (welding, hydraulics, composite repair, sheet metal, etc.) required for the mission
- Adequate housing, dormitory space, visiting quarters, and associated base support operations and personnel

Depending on location, a variety of other service-type facilities and infrastructure could be required to support the FTU mission. These could include child development centers (CDCs), utilities, roads, taxiways, overruns, dining facilities, and fitness centers.

Hangars, Aircraft Maintenance Unit (AMU), Squadron Operations (Squad Ops). The number of hangars required at a base is dependent on the PAA for that base. Based on Air Force Manual (AFMAN) 32-1084, eight PAA would require one general maintenance hangar, one corrosion control hangar, and one fuel cell hangar. In addition, eight PAA would drive the need for up to two additional hangar spaces either in existing facilities or in a newly constructed or modified facility. The general maintenance hangar would function primarily as an inspection hangar and secondarily as a repair hangar for scheduled and unscheduled maintenance. The corrosion control hangar would include a self-contained paint booth for touch-ups and would also function as a wash rack. The fuel cell maintenance hangar is primarily used to remove, repair, and replace fuel cell tanks from aircraft. Hangars must be appropriately sized based on the dimensions and clearance requirements of the KC-46A aircraft unless a waiver is granted.

The FTU mission would also require one Squad Ops facility and one AMU facility. These facilities are typically combined in a two-story facility, with the AMU function on the first floor and office space for command, administration, mission planning, briefing, and support on the second floor. The AMU space serves as a home base for technicians working on the flightline and also houses the administrative functions for the flightline.

The USAF has determined that the life support functions, previously included in the Squad Ops facilities, would become a stand-alone AFE facility. All facilities would be designed based on the Total Force Integration (TFI) concept.

Flightline Development. To support the KC-46A FTU mission, a 7,000-foot-long, 147-foot-wide runway capable of handling aircraft with a takeoff weight of 415,000 pounds is needed. The KC-46A FTU would require a minimum of eight parking spaces, plus additional space for taxiways. In addition, the FTU mission would require an available and functioning RAPCON, ILS, TACAN, and NAVAIDS capable of supporting day-night landings. The flightline would also require an Intrusion Detection and Surveillance System capable of supporting the additional aircraft.

Fuels Infrastructure. To support the FTU mission, the base must be able to receive up to 190,000 gallons of jet fuel per day from commercial sources to maintain adequate supply. Fuels storage at the base selected would include storage facilities with a minimum of 946,000 gallons of capacity and would be able to dispense fuel through a Type III hydrant system to support KC-46A refueling (at a rate of 2,400 gallons per minute).

Flight Training Center (FTC) and Fuselage Trainer (FuT). New aircraft like the KC-46A require a combination of an FTC with full WST simulators, BOT simulators, P-PTTs, classroom space, instructor accommodations/staff, command and control (C2), and administrative space/staff to receive and train aircrews and an FuT facility with fuselage trainers, classroom space, and cargo loading training yards. This training is composed of three elements of learning:

- Academics, designed to provide essential aircraft system knowledge, procedural memorization for safe operation, and tactical employment theory for combat operations
- Virtual and P-PTTs, BO-PTTs, BO simulators, and flight simulators to bridge academics and actual flying with hands-on manipulation of the aircraft and associated systems
- Actual aircraft operation to build flight-specific habit patterns, develop situational awareness, acclimate the aircrew to the high-performance environment, and achieve sufficient levels of required proficiency

Formal training involves classroom work; virtual and P-PTTs/BO-PTTs and flight simulators such as WST, FuT, and/or BOT sessions; and flight time in the aircraft. All cargo operations training would be performed in the FuT or in a parked aircraft.

The FTC requires space to house six bays for WSTs, five BOTs, four P-PTTs, three BO-PTTs, and adjoined or adjacent classroom and office space. The two FuTs require administrative and academic space, two open bays, and two cargo yards adjacent to the flightline.

Housing and Support Facilities. Housing for eligible permanent-party military personnel associated with the FTU mission would include privatized base housing or housing available in the local market off base. All eligible unaccompanied enlisted permanent-party personnel would be housed in dormitories under the FTU mission. Visiting Quarters are required for all unaccompanied officer and enlisted students. Civil servant and contractor personnel supporting the FTU would not be authorized on-base housing or lodging.

2.3.1.2 FTU Personnel Requirements

Basing of the KC-46A FTU mission would require sufficient personnel to operate and maintain the aircraft and to provide necessary support services. Depending on the existing personnel, including the reserve component of the mission at the selected FTU base, the requirement would be between 300 and 450 full-time personnel. These requirements would also be influenced by the reserve or guard component of the mission. Personnel would include active-duty and reserve (both full- and part-time), officer, enlisted, DoD civilian, contractor support personnel, and BOS personnel. In addition to the personnel required to support the mission, the family members or dependents of full-time military personnel are also included in the analysis. Family members and dependents were estimated at 2.5 times 65 percent of the full-time military personnel. School-age dependents of full-time military personnel were estimated at 1.5 times 65 percent of full-time military personnel.

2.3.1.3 FTU Flight Operations

KC-46A flight operations at the FTU base would focus on training aircrews to develop the capability needed for all mission requirements. Training events would include such skills as formation flying, advanced aircraft handling, and tactics related to the different missions expected of the multi-role KC-46A. Aircrews would train at a home base and at auxiliary airfields, and the majority of training would be completed in simulators. Flight training activities are described below.

Training activities may be categorized as a sortie and/or an operation. The majority (99 percent, or 1,800) of annual sorties departing from the home base at the FTU would be training sorties and would include a variety of prescribed skills that the crew must complete. A small number (1 percent, or 26) of annual sorties from the home base would be mission sorties where the aircraft departs the base to complete a given mission (e.g., refueling another aircraft). All sorties involve one takeoff and landing from the home base location.

Flight operations could include takeoff, closed pattern (a closed pattern consists of two portions: a takeoff/departure and an approach/landing, and is therefore considered two operations), and landing. Additional flight operations for KC-46A training events are described below.

A typical KC-46A training sortie would be similar to a KC-135 training sortie and would involve students and instructors departing from the base, climbing to altitude for aerial refueling training, and accomplishing a variety of different flight operations. Training sorties typically depart from and return to the home base on the same day (mission sorties may return to the home base on a different day). Flight training in local patterns would be completed at the home base or by using an auxiliary airfield, either military or civilian, depending on the availability of suitable facilities, within a convenient range of the home base. Existing associated air refueling (AR) tracks would be used for tanker and receiver training. Much like the KC-135 student pilots, KC-46A students would use the auxiliary airfields for various landings, such as a straight-in landing, an overhead break (overflying the airfield, then maneuvering within visual sight of the runway to get in a position to safely land), touch-and-go landings, conventional landings, or closed patterns.

*The terms sortie and operation are used to describe flight activities. Each has a different meaning and applies to a different set of flight activities. These terms are also used to quantify flight activities for the purpose of environmental impact analysis. A **sortie** consists of a single military aircraft flight from the initial takeoff through the final landing and includes all activities that occur during that mission. For this EIS, the term sortie is used when referring to the quantity of aircraft operations from the airfield. A sortie can include more than one operation. The term **operation** consists of a single activity such as a landing or a takeoff. During a single sortie, one KC-46A could perform several operations; therefore, the number of operations could exceed the total number of sorties.*

Mirroring the current KC-135 FTU, KC-46A training would take place 240 days annually (following a standard 5-day training week). The KC-46A FTU average sortie would be around 5 hours in duration. The current training plan for the KC-46A FTU is an average of 7.5 sorties per day.

During training activities, aircrews would use two types of landing and takeoff profiles, a standard profile and a tactical profile. Standard profiles use a typical straight-in or straight-out landing or takeoff. Tactical landings and takeoffs are a more rapid spiral-in or spiral-out maneuver. About 10 percent of training takeoffs would use a standard profile and about 90 percent would use a tactical profile. About 20 percent of training landings would use a straight-in landing profile and about 80 percent would use tactical profiles.

Each training sortie would perform an average of approximately 10.5 closed patterns (which equates to about 21 airfield operations). About 60 percent of daytime sorties would fly in local patterns near the home base and about 40 percent would be flown at the auxiliary airfields outside the local area. All nighttime operations (between the hours of 10:00 P.M. and 7:00 A.M.) would be conducted at the FTU base only.

2.3.1.4 FTU Airspace Use

Aircrews associated with the FTU would use a combination of existing airspace to perform training missions. The Federal Aviation Administration (FAA) has designated airspace within the United States as Controlled, Special Use, Other, or Uncontrolled. A sortie-operation is the use of one airspace unit by one aircraft. The number of sortie-operations is used to quantify the number of times a single aircraft uses an airspace unit and is not a measure of how long an aircraft uses an airspace unit. Special Use Airspace (SUA) identified for military and other governmental activities is charted and published by the FAA. SUA is designated airspace within

which flight activities are conducted that requires confinement of participating aircraft or may place operating limitations on nonparticipating aircraft. SUA includes Military Operations Areas.

The KC-46A would be operated in existing airspace, and the types of flight operations would mirror the existing or historical KC-135 operations. The KC-46A would use existing AR tracks and fuel jettison areas, if necessary. FTU sorties involving refueling training and practice would primarily take place in designated AR tracks.

2.3.2 KC-46A MOB 1 Mission-Specific Requirements

The basic requirements for the three KC-46A MOB 1 squadrons (12 aircraft per squadron) include the physical infrastructure, land, airspace, personnel, and water and energy assets needed to support the MOB 1 mission. This section presents the criteria that apply to the MOB 1 siting, facilities for mission and mission support functions, and personnel authorized to execute work related to the mission and flying operations required as part of the MOB 1 mission.

2.3.2.1 MOB 1 Facility and Infrastructure Requirements

The basic allocation and physical requirements necessary to support three squadrons of 12 KC-46A are listed below.

- Four (4) General Maintenance Hangars
- One (1) Fuel Cell Hangar
- One (1) Corrosion Control/Wash Rack Hangar
- Three (3) Squad Ops Facilities
- Three (3) AMU Facilities
- One (1) FTC consisting of:
  - Three (3) WSTs
  - Two (2) BOTs
  - One (1) P-PTT
- One (1) FuT
- One (1) Maintenance Training Facility (MTF)
- Supply Warehousing, Flightline Support Facility and Aircraft Parts Storage
- Aerospace Ground Equipment (AGE) storage and parking
- Aerial Port Cargo Facility/Processing Yard and Passenger Terminal
- Crash Recovery Shop with adequate vehicle parking
- Alternate Mission Equipment (AME) Storage and Maintenance Facility (pallets, etc.)
- Runway: minimum 147-feet wide by 7,000-feet long with a weight-bearing capability of 415,000 pounds
- Twenty-three (23) parking spots with Fuel Pits and a Type III Fuel Hydrant System on the parking ramp
- Appropriate fuel supply, storage, and distribution systems to support 36 PAA
- RAPCON, ILS, TACAN, and NAVAIDS that can support the KC-46A
- A variety of shop areas (welding, hydraulics, composite repair, sheet metal, etc.) required for the mission

Depending on the location, a variety of other service-type facilities and infrastructure could be required to support the MOB 1 mission. These could include CDCs, utilities, roads, taxiways, overruns, dining facilities, fitness center, visiting quarters, dormitories, and possibly new housing.

Hangars, Aircraft Maintenance Units (AMUs), Squadron Operations (Squad Ops). The number of hangars required at a base is dependent on the PAA for that base. Based on AFMAN 32-1084, 36 PAA would require four general maintenance hangars, one fuel cell hangar, and one corrosion control hangar. The general maintenance hangar would function primarily as an inspection hangar and secondarily as a repair hangar. The corrosion control hangar would include a self-contained paint booth for touch-ups and would also function as a wash rack. The fuel cell hangar would primarily be used to remove, repair, and replace fuel cell tanks from aircraft.

The MOB 1 mission would also require three Squad Ops facilities and three AMU facilities. These would be two-story facilities, as described in the FTU section.

The USAF has determined that the life support functions, previously included in the Squad Ops facilities, would become a stand-alone AFE facility. All facilities would be designed based on the TFI concept.

Flightline Development. To support the KC-46A MOB 1 mission, a 7,000-foot-long, 147-foot-wide runway capable of handling aircraft with a takeoff weight of 415,000 pounds is needed. The 36 PAA would require 23 parking spaces, plus additional space for taxiways. In addition, the MOB 1 mission would require an available and functioning RAPCON, ILS, TACAN, and NAVAIDS capable of supporting day-night landings. The flightline would also require an Intrusion Detection and Surveillance System capable of supporting the additional aircraft.

Fuels Infrastructure. To support the MOB 1 mission, the base must be able to receive up to 360,000 gallons of jet fuel per day from commercial sources to maintain adequate supply. Fuels storage at the base selected would include storage facilities with up to 1.8 million gallons of capacity and would be able to dispense fuel through a Type III hydrant system.

Flight Training Center (FTC) and Fuselage Trainer (FuT). New aircraft like the KC-46A require a combination of a formal training center with full system trainers, part task trainers, simulators, classroom space, instructor accommodations/staff, C2, and administrative space/staff to receive and train aircrews. Although the MOB 1 scenario's primary mission would not be training, some training would be required. Formal training involves classroom work; virtual and P-PTTs and flight simulators such as WST, FuT, and BOT sessions; and flight time in the aircraft. All cargo operations training would be performed in the FuT or in a parked aircraft.

The FTC requires three bays for the WSTs, two BOTs, one P-PPT, an adjoined or adjacent classroom, and office space. The FuT requires administrative and academic space, one open bay, and one cargo yard adjacent to the flightline.

Housing and Support Facilities. Housing for eligible permanent-party military personnel associated with the MOB 1 mission would include privatized base housing or housing available in the local market off base. For the MOB 1 mission, dormitories would be used for all unaccompanied enlisted students and for permanently assigned, unmarried first-term Airmen. Adequate child care, medical, fitness center, and other BOS/force support must also be available.

2.3.2.2 MOB 1 Personnel Requirements

Basing of the KC-46A MOB 1 mission would also require basing sufficient personnel to operate and maintain the aircraft and to provide necessary support services. Depending on the existing personnel, including the reserve or guard component of the mission at the selected MOB 1 base,

the requirement would be between 1,700 and 1,800 full-time personnel. This would include both active-duty and reserve (both full- and part-time), officer, enlisted, DoD civilian, contractor support personnel, and BOS personnel. In addition to the personnel required to support the mission, the dependents or family members of full-time military personnel are also included in the analysis. Family members and dependents were estimated at 2.5 times 65 percent of the full-time military personnel. School-age dependents of full-time military personnel were estimated at 1.5 times 65 percent of full-time military personnel.

2.3.2.3 MOB 1 Flight Operations

KC-46A aircrews associated with the MOB 1 mission would complete mission sorties and local training sorties to maintain proficiency in the aircraft. These sorties would originate at the home base, and no auxiliary airfields would be required for the MOB 1 beddown. The majority of proficiency training would occur in simulators. For those tasks that require in-flight training, a typical training sortie is described below.

A typical KC-46A proficiency training sortie would be similar to a KC-135 training sortie and would include a takeoff from the home base, climb to altitude for aerial refueling training, accomplishing takeoff, landing, and closed pattern training and then a return to the home base for a landing. Proficiency training sorties typically depart from and return to the home base on the same day. A mission sortie typically departs the home base and returns on a later day. All sorties involve one takeoff and landing from the home base. The following information describes sorties for most bases, but could vary depending on the MOB 1 location.

Typically, training sorties would depart to an existing AR track or other training area and return to the home base. About 75 percent of training takeoffs would use a standard profile, while about 25 percent would use a tactical profile. Upon arrival, about 60 percent of these sorties would use a straight-in landing profile, while about 40 percent would use varied approach profiles. Most training sorties would perform about six closed patterns (which equates to about 12 airfield operations). Any sorties between the hours of 10:00 P.M. and 7:00 A.M. local time would be considered environmental night.

The majority of annual sorties departing from home base would be training sorties to maintain aircrew proficiencies. A minority of sorties departing from home base would be mission sorties. Training sorties are normally performed 6 days a week, or 312 days per year. Mission sorties could occur 365 days a year. About 90 percent of all sorties are during the day and 10 percent are at night. Mission sorties generally use a standard takeoff profile, and 80 percent are non-heavyweight (takeoff weight of 253,000 pounds or less). Mission sorties normally arrive back at the home base using a standard final approach, with the aircraft coming to a full stop on landing.

2.3.2.4 MOB 1 Airspace Use

The MOB 1 squadrons would use a combination of existing airspace to perform their missions. The FAA has designated the airspace within the United States as Controlled, Special Use, Other, or Uncontrolled. SUA identified for military and other governmental activities is charted and published by the FAA. SUA is designated airspace within which flight activities are conducted that requires confinement of participating aircraft or may place operating limitations on nonparticipating aircraft.

The KC-46A would be operated in existing airspace, and the types of flight operations would mirror the existing or historical KC-135 operations. The KC-46A would use existing AR tracks and fuel jettison areas. Flight activities involving refueling training and practice would primarily occur in designated AR tracks.

2.3.3 Initial Operational Test and Evaluation (IOT&E)

Four production-representative KC-46A aircraft, to be used during Initial Operational Test and Evaluation (IOT&E), would arrive at the MOB 1 in early 2016. During IOT&E, the Air Force Operational Test and Evaluation Center would test the capabilities of the KC-46A under realistic operational conditions. The MOB 1 would provide that realistic operational environment. Activities evaluated would include basic flight operations, sortie generation, aircraft maintenance, refueling system performance, supply support, and basing requirements.

KC-46A aircraft operations during IOT&E would be very similar to the existing KC-135 operations occurring at the base. Until specific operational procedures are developed for the KC-46A, the USAF would use operational procedures developed for the KC-135 aircraft. During IOT&E, expected operations include single ship and formation launches and recoveries at varying fuel weights to include maximum performance takeoffs, simulated combat tactical maneuvering, and formation surge operations (launching all test aircraft in a minimum amount of time) during the day and night. The intent for IOT&E is that the KC-46A would be operated similar to the KC-135, utilizing the local base and global operating procedures.

The USAF anticipates that, as more knowledge is gained about the new aircraft and crewmember needs, some adjustments would occur using an adaptive management approach to achieve the most streamlined and sustainable operational and training programs.

2.4 DESCRIPTION OF ALTERNATIVE BASING LOCATIONS

Depending on available infrastructure, facilities, and to some degree, personnel, available for the KC-46A FTU or MOB 1 mission, proposed construction, demolition, renovations, and incoming personnel numbers vary between alternatives. The facility siting analysis for each alternative base took into consideration the functional requirements of the FTU and MOB 1 missions and compared them with the existing infrastructure and environmental constraints at each base. The following subsections provide specifics about the beddown and operations at each of the alternative bases. Table 2-2 provides a summary comparison of the alternatives for each mission, along with the No Action Alternative.

Table 2-2. Summary of Alternatives

Alternative Components	Altus AFB FTU/MOB 1	Fairchild AFB MOB 1	Grand Forks AFB MOB 1	McConnell AFB FTU/MOB 1	No Action Alternative
Current KC-135 PAA	18	30	0	44	Varies by location
Proposed KC-46A PAA	Up to 8/36	36	36	Up to 8/36	0
Facilities and Infrastructure	See Sections 2.3.1 and 2.3.2 for the FTU- and MOB 1-specific facilities and infrastructure requirements.				None
Personnel and Dependent Change[a]	+578/+4,917	+1,095	+4,526	+570[b]/-291[c]	0
Aircraft Operations Change[d]	+41,364/+33,710	+18,796	+33,710	+41,364[e]/+9,189[e]	0

[a] Does not include DoD civilians, part-time Reservists or contractors (other base personnel) under the assumption that these are local.
[b] The McConnell AFB FTU personnel and dependent numbers are different from the Altus AFB FTU personnel and dependent numbers because the FTU mission at McConnell AFB would be additive and the MOB 1 mission would be a replacement mission.
[c] The MOB 1 scenario is a replacement mission at McConnell AFB with a net reduction in full-time military personnel.
[d] Aircraft operations change is the difference between the total baseline and total projected for all aircraft types.
[e] Baseline PAA for McConnell AFB is 44 KC-135 aircraft.

2.4.1 Altus Air Force Base (FTU or MOB 1)

The USAF is considering two different actions for Altus AFB. One action, for which Altus AFB has been selected as the Preferred Alternative, includes the beddown of one FTU squadron by Air Education and Training Command (AETC) with up to eight KC-46A aircraft. A second action would be the beddown of three squadrons by AMC with 36 KC-46A aircraft for the MOB 1 mission. These are separate actions; Altus AFB could only be selected for the implementation of one of these actions (as described in Chapter 1). The classic association (active led, AFRC supported) would continue if Altus AFB is selected for beddown of the KC-46A FTU or MOB 1 mission.

Section 2.4.1.2 describes the personnel changes, physical and development changes, airfield operations, and changes in use of auxiliary airfields that would occur with implementation of the FTU scenario. Section 2.4.1.3 describes changes that would occur with implementation of the MOB 1 scenario. No auxiliary airfields would be used as part of the MOB 1 scenario.

2.4.1.1 Altus AFB Overview

Altus AFB is located in the southwestern corner of Oklahoma, adjacent to the City of Altus (see Figure 2-2). The base is at a field elevation of 1,382 feet and covers an area of approximately 8,016 acres. Two runways (13,440 feet and 9,000 feet in length) and one assault landing zone (3,500 feet in length) are located at Altus AFB. The overall layout of existing facilities and infrastructure at Altus AFB is shown on Figure 2-3.

Originally named Altus Army Airfield, the base was constructed in 1942, with military personnel and aircraft arriving in 1943. The primary training aircraft in the early years of Altus AFB were the Cessna AT-17 Bobcat, the Curtiss-Wright AT-9 Jeep, and the C-45 Expeditor. Altus AFB was inactive from May 1945 until August 1953, when many bases were reactivated following the onset of the Korean War. In the early 1960s, under the 577th Missile Squadron, Altus AFB maintained 12 Atlas intercontinental ballistic missile silos within a 40-mile radius of the base. In 1967, Altus AFB became home to the C-141 Starlifter and the C-5 Galaxy under the 443rd Military Airlift Wing of the Military Airlift Command; in the early 1970s, Altus AFB was assigned KC-135 aircraft under the 340th Air Refueling Wing (ARW). The C-17 Globemaster arrived at Altus AFB in 1996. In 2007, both the C-141 and C-5 ceased operating at Altus AFB.

Altus AFB is currently home to 97th Air Mobility Wing (AMW) and supports four major units: the 97th Operations Group, the 97th Mission Support Group, the 97th Maintenance Directorate, and the 97th Medical Group. The 97 AMW provides formal initial and advanced specialty training for the C-17 Globemaster and the KC-135 Stratotanker. In 2012, the AFRC's 730th Air Mobility Training Squadron (AMTS) was reactivated at Altus AFB as part of the USAF's TFI. The 730 AMTS works side by side with active-duty Airmen in the 97 AMW training C-17 and KC-135 aircrew members.

2.4.1.2 FTU Beddown Specifics

The USAF determined that Altus AFB's infrastructure and base resources could accommodate the basic requirements for the KC-46A FTU mission within the constraints set by the alternative narrowing process described in Section 2.2. This section details the actions that would occur at Altus AFB if the base were selected for the basing of the KC-46A FTU mission. The FTU scenario would be additive to the current mission at Altus AFB, and the first four of up to eight aircraft would be scheduled to arrive in 2016. The current aircraft inventory at Altus AFB includes 17 C-17 aircraft and 18 KC-135 aircraft.

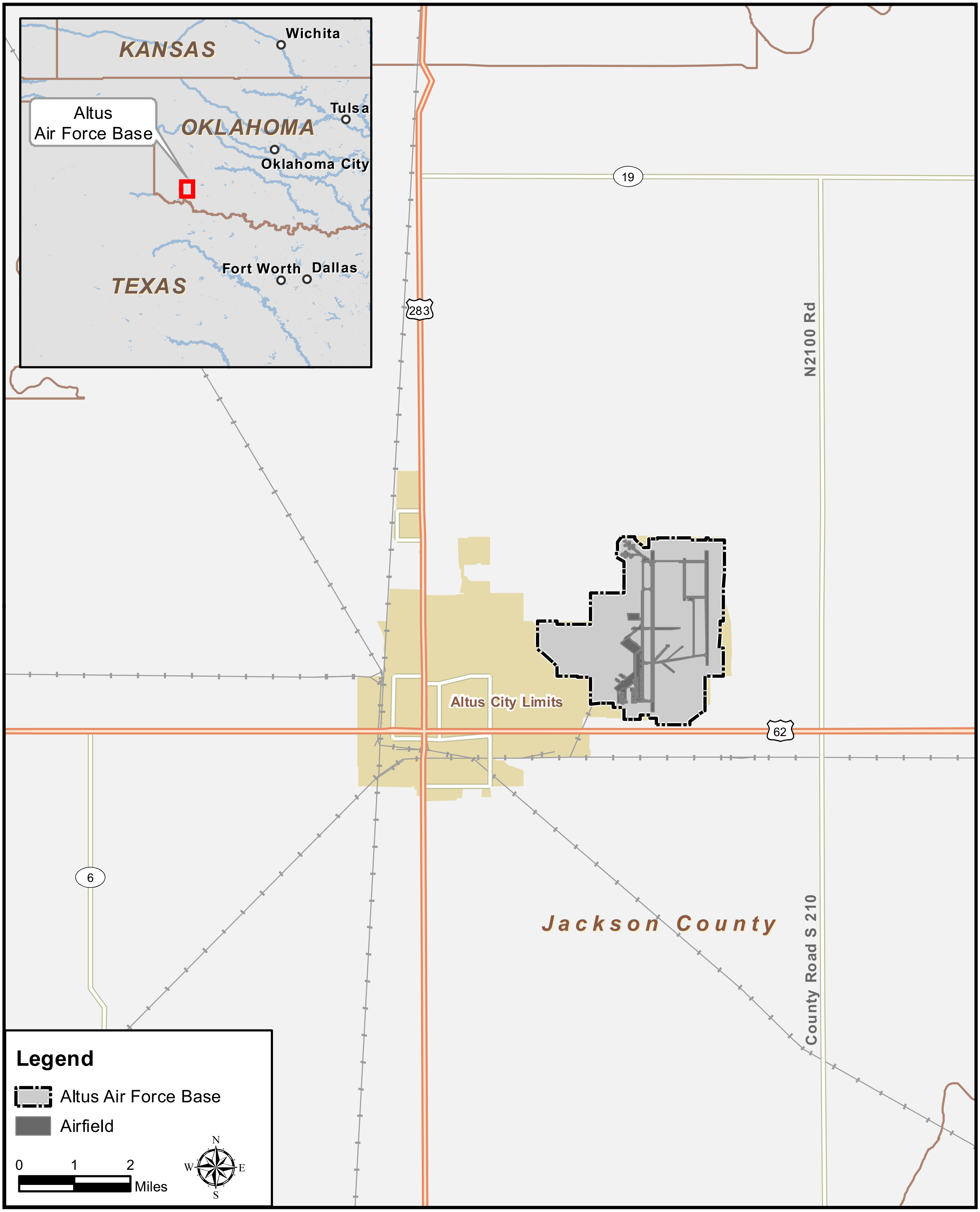
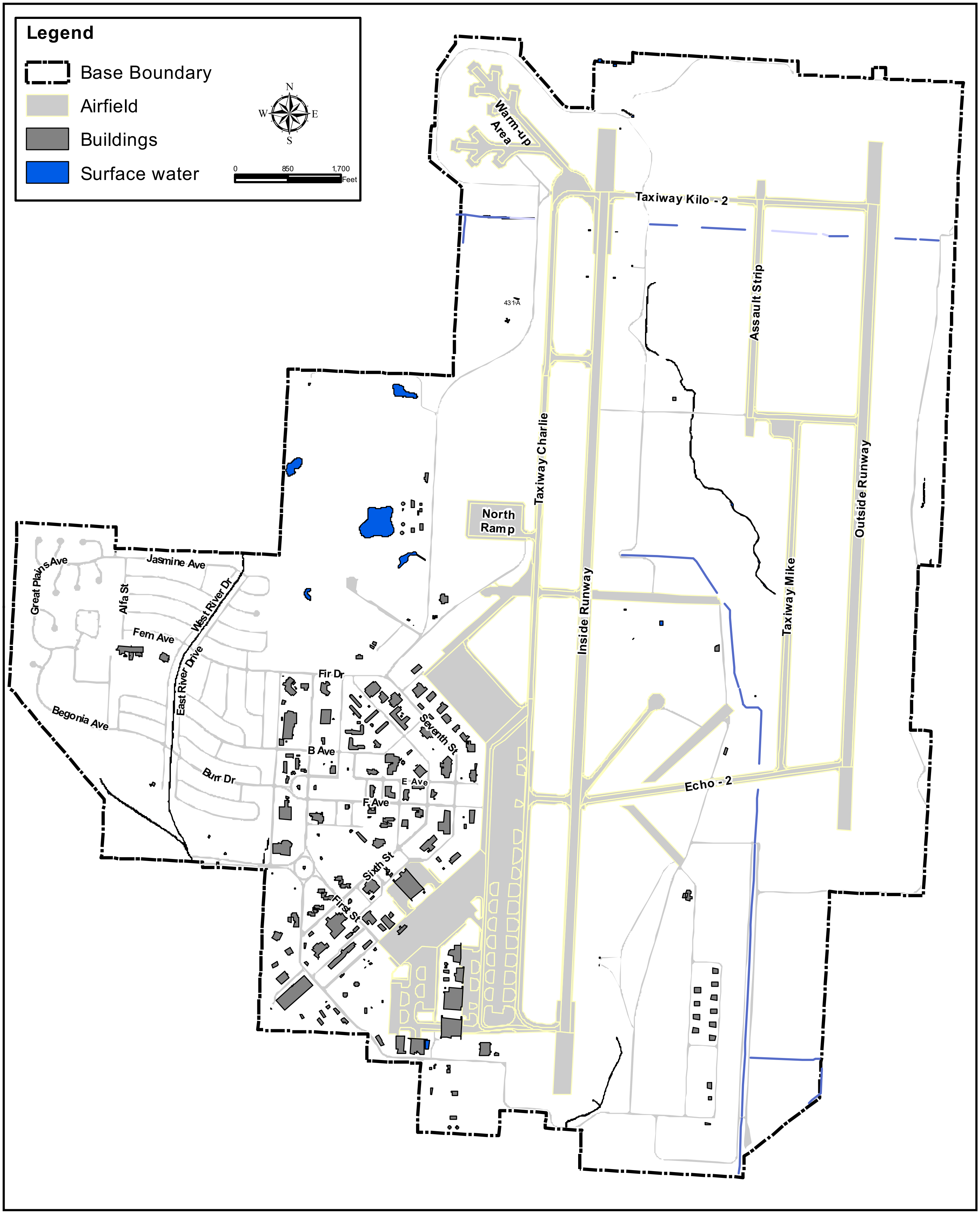


Figure 2-2. Regional Location of Altus AFB, Oklahoma



Path: H:\KC-46a\Bases\Altus\GIS\Projects\Figure 2-3 Installation Overview Altus AFB ARG updates 06112013 [used ID_2_3].mxd

Figure 2-3. Base Overview Altus AFB

2.4.1.2.1 Facilities and Infrastructure

The overall facility requirements for the FTU beddown are described in Section 2.3.1.1. Most of these requirements are met through existing infrastructure and facilities on Altus AFB. However, some modifications and additions to existing facilities and infrastructure would be required at Altus AFB to support KC-46A FTU training operations. Table 2-3 lists the KC-46A FTU-related projects that would take place within the previously disturbed cantonment area of Altus AFB, as shown on Figure 2-4.

Existing flight operations and refueling activities associated with the C-17 and KC-135 FTUs would continue during demolition and reconstruction activities. During demolition and construction of the new hydrant systems, additional refueling vehicles would be used to maintain the C-17 and KC-135 missions.

Table 2-3. Facilities and Infrastructure Projects for the KC-46A FTU Scenario at Altus AFB

Project	Facility Size (Square Feet)
Demolition	
Building 170 (to make room for new FuT Facility)	25,469
Building 171 (to make room for new Flight Training Facility)	11,264
Total Square Feet	**36,733**
Renovation	
Building 87, Group Headquarters and Mission Training	6,237
Building 394, Contractor Supply Storage	7,000
Total Square Feet	**13,237**
New Construction	
FTC	36,821
FuT Facility	45,690
Hydrant pit (one pit added to existing system)	~100
Total Square Feet	**82,611**
Additions/Alterations	
Building 193, Squad Ops/AMU	29,995
Building 518, Tail Enclosure and Fuel Cell Expansion	12,322
Building 285, Tail Enclosure and Tool Crib Expansion	~12,000
Total Square Feet	**54,317**

2.4.1.2.2 Personnel

The current personnel at Altus AFB and the projected increase necessary to support the KC-46A FTU mission are provided in Table 2-4. Currently, the base has about 4,000 personnel, including military, part-time reserve, government civilians, contractors, and students. The current student population varies depending on training and syllabi schedules, but represents an average daily student load (ADSL) at Altus AFB. The ADSL for the KC-46A FTU would be 200. Because the FTU mission at Altus AFB would be in addition to the existing missions, an increase in personnel would be anticipated. The KC-46A FTU mission would require approximately 144 full-time military (includes 119 active-duty, 12 reserve, and 13 BOS) personnel, approximately 20 part-time reserve personnel, approximately 252 DoD civilian personnel, and approximately 23 contractors (categorized as "other base personnel").

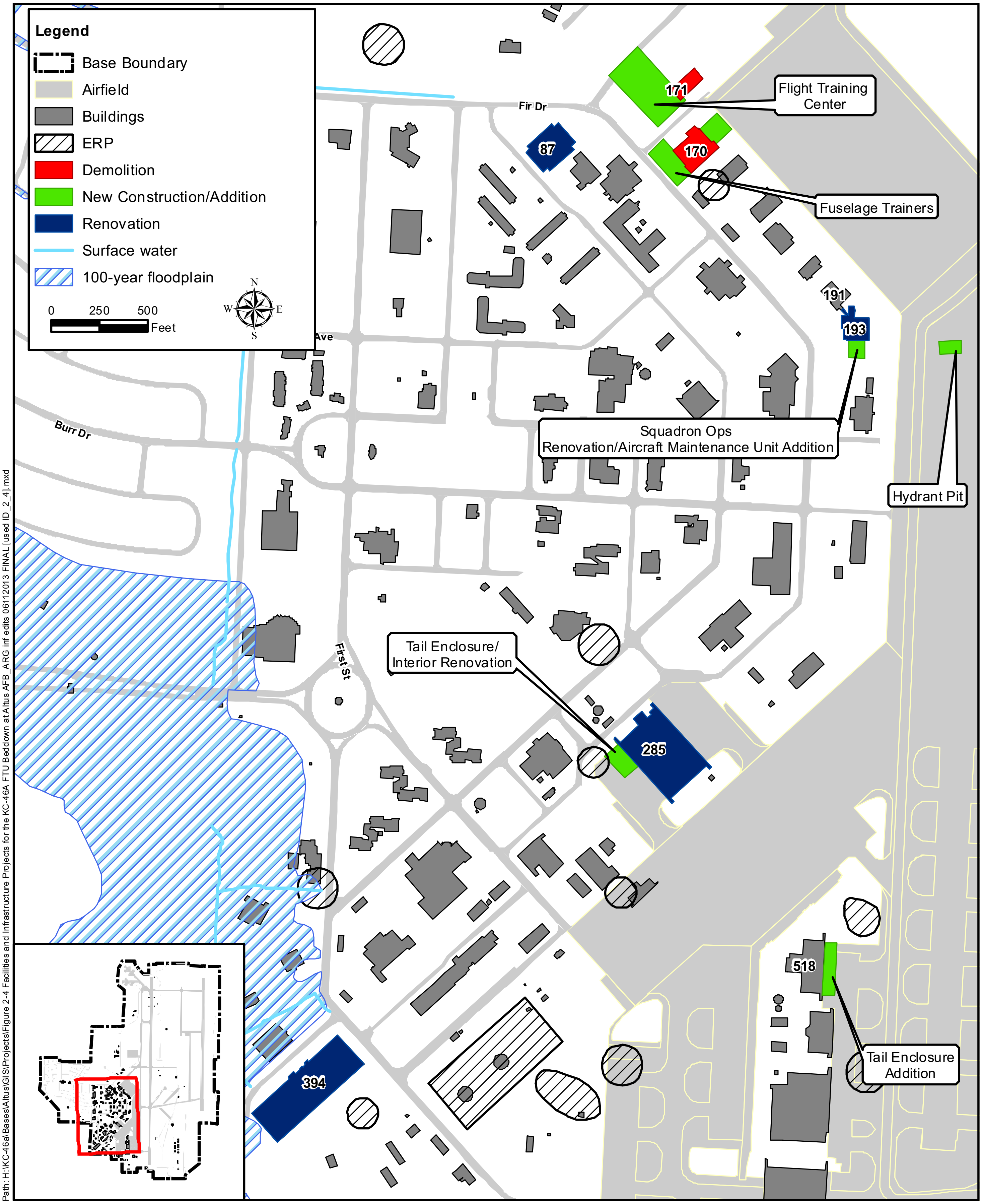


Figure 2-4. Facilities and Infrastructure Projects for the KC-46A FTU Scenario at Altus AFB

Table 2-4. Altus AFB KC-46A FTU Scenario Personnel and Dependent Changes

Personnel	Baseline	KC-46A FTU Scenario	Total
Military (full-time)	1,379	144	1,523
Military Dependents and Family Members	1,051	234[a]	1,285
Part-Time Reservists	19	20	39
Students	362	200	562
DoD Civilian	1,243	252	1,495
Other Base Personnel	907	23	930
Total	**4,961**	**873**	**5,834**

[a] Dependents estimated at 2.5 times 65 percent of full-time military personnel only.

About 1,051 military dependents, currently associated with the full-time military personnel at Altus AFB, live in communities surrounding the base. Approximately 234 family members and dependents would be anticipated to accompany the full-time military personnel associated with the KC-46A FTU mission.

2.4.1.2.3 Flight Operations

Table 2-5 provides a comparison of the number of annual airfield operations anticipated with the beddown of the KC-46A FTU mission at Altus AFB to the existing baseline mission. The table shows that the total annual operations at Altus AFB would increase from 109,459 per year to 150,823, resulting in an approximate 38 percent increase in annual aircraft operations.

Table 2-5. Altus AFB Baseline and Projected Annual FTU Scenario End-State Airfield Operations[a]

Aircraft	Unit Flying Days/ Year	Baseline						Projected					
		Landings and Takeoffs		Closed Pattern[b]		Total		Landings and Takeoffs		Closed Pattern[b]		Total	
		Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual
C-17	240	41.98	10,075	172.78	41,467	214.76	51,542	41.98	10,075	172.78	41,467	214.76	51,542
KC-135	240	16.50	3,960	219.20	52,608	235.7	56,568	16.50	3,960	219.20	52,608	235.70	56,568
Transient[c]	240	2.84	682	2.78	667	5.62	1,349	2.84	682	2.78	667	5.62	1,349
KC-46A[d]	240	0	0	0	0	0	0	15.22	3,653	157.13	37,711	172.35	41,364
	Total	**61.32**	**14,717**	**394.76**	**94,742**	**456.08**	**109,459**	**76.54**	**18,370**	**551.89**	**132,453**	**628.43**	**150,823**

[a] An operation is the accomplishment of a single maneuver such as a takeoff/departure, an arrival/landing, or half of a closed pattern.
[b] A closed pattern consists of two operations: one takeoff and one landing. The numbers presented are operations.
[c] The primary transient military aircraft types using Altus AFB include C-130, C-17, C-21, and T-38.
[d] The normal flying hours for Altus AFB are 9:30 A.M. to 2:30 P.M. However, approximately 20 percent of the total KC-46A operations would occur during environmental night (10:00 P.M. to 7:00 A.M.).

2.4.1.2.4 Auxiliary Airfields

The existing KC-135 and C-17 aircraft at Altus AFB currently use four auxiliary airfields. The KC-46A aircraft associated with the FTU would use the same AR tracks, the four auxiliary airfields and, if necessary, fuel jettison areas as are currently used by the KC-135 FTU. A variation to the typical training sortie described above could involve performing closed patterns at an auxiliary airfield. Auxiliary airfields currently used by Altus AFB include Clinton-Sherman Industrial Airpark (CSM), Lubbock Preston Smith International Airport (LBB), Rick Husband Amarillo International Airport (AMA), and Fort Worth Alliance Airport (AFW). The location of these airfields relative to Altus AFB is shown on Figure 2-5.

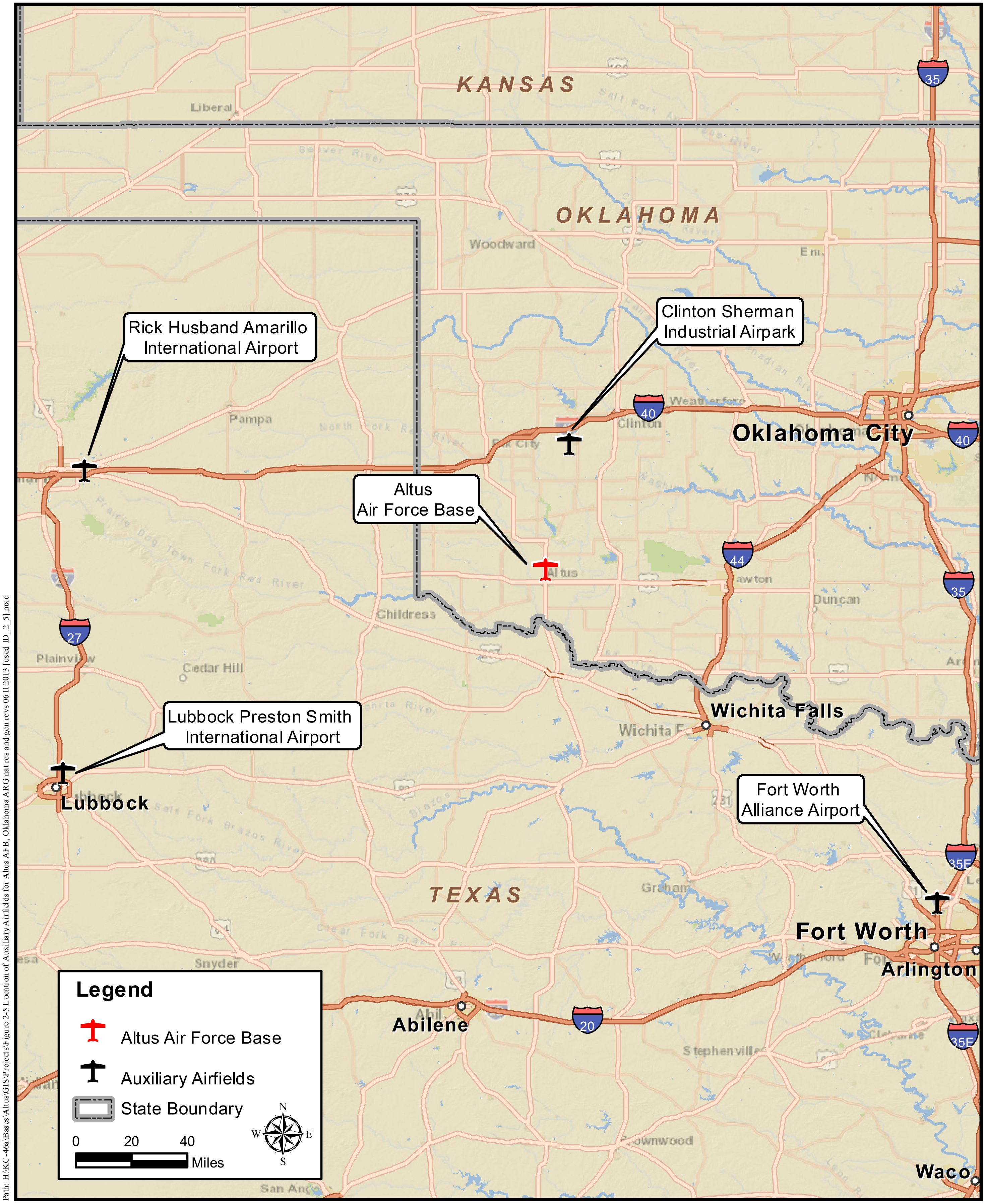


Figure 2-5. Location of Auxiliary Airfields for the KC-46A FTU Scenario at Altus AFB, Oklahoma

The KC-46A aircrews would use the same flight tracks that the KC-135 aircraft currently use to access the auxiliary airfields. KC-46A aircrews associated with the FTU would fly a combined estimate of 6,516 annual aircraft operations at the four auxiliary airfields.

Rick Husband Amarillo International Airport (AMA). This commercial airport is co-located with the former Amarillo AFB, a former Strategic Air Command (SAC) airfield with a 13,502-foot-long runway (Runway 04/22). This runway is now used primarily for commercial aviation, but still supports a small number of military operations each year. Runway 13/31 is the second runway at AMA measuring 7,901 feet in length. AMA encompasses approximately 3,547 acres and is owned by the City of Amarillo, Texas. There are currently 54,115 annual airfield operations at AMA. Both KC-135 aircraft and C-17 aircraft from Altus AFB currently use the airport for training operations.

Clinton Sherman Industrial Airpark (CSM). As a former SAC base, CSM has one of the longest runways in Oklahoma—Runway 17R/35L, measuring 13,503 feet in length and approximately 300 feet wide. This airpark also has a second runway, Runway 17L/35R, measuring 5,193 feet in length. Owned by Oklahoma Space Industry Development Authority, CSM is located approximately 15 miles southwest of Clinton, in Washita County, Oklahoma. The airpark encompasses approximately 2,700 acres and is an ideal site for pilot training because of the size of the runway and the remote nature of the location. CSM is currently being used by KC-135 and C-17 pilots from Altus AFB, as well as by pilots from Vance and Sheppard AFBs. CSM also supports Navy and non-commercial flight operations. CSM currently supports a total of 28,485 annual airfield operations.

Lubbock Preston Smith International Airport (LBB). This airfield served a military function during World War II, but has been in commercial service since the 1950s. With three runways, LBB is one of the busiest airports in Texas and supports a hub for Federal Express. The longest runway at LBB is Runway 17R/35L, measuring 11,500 feet in length. The other two runways at LBB are Runways 8/26 and 17L/35R, with respective lengths of 8,003 and 2,891 feet. LBB encompasses approximately 3,000 acres and is owned by the City of Lubbock, Texas. LBB currently supports 67,919 annual operations, including training operations by both the KC-135 and C-17 aircraft from Altus AFB.

Fort Worth Alliance Airport (AFW). This airport was developed as a commercial airport in 1989 and served to off-load some of the excess traffic from Dallas-Fort Worth Airport. AFW has two parallel runways; Runway 16L/34R is 9,600 feet in length and Runway 16R/34L is 8,220 feet in length. AFW encompasses approximately 1,198 acres and is owned by the City of Fort Worth, Texas. There are currently 100,756 annual airfield operations at AFW, of which military operations account for about 15 percent. KC-135 aircraft from Altus AFB make up a portion of the military aircraft operations.

2.4.1.3 MOB 1 Beddown Specifics

This section details the actions that would occur at Altus AFB if selected to base 36 KC-46A aircraft for the MOB 1 mission. The MOB 1 mission would add to the existing KC-135 and C-17 FTU missions at Altus AFB.

2.4.1.3.1 Facilities and Infrastructure

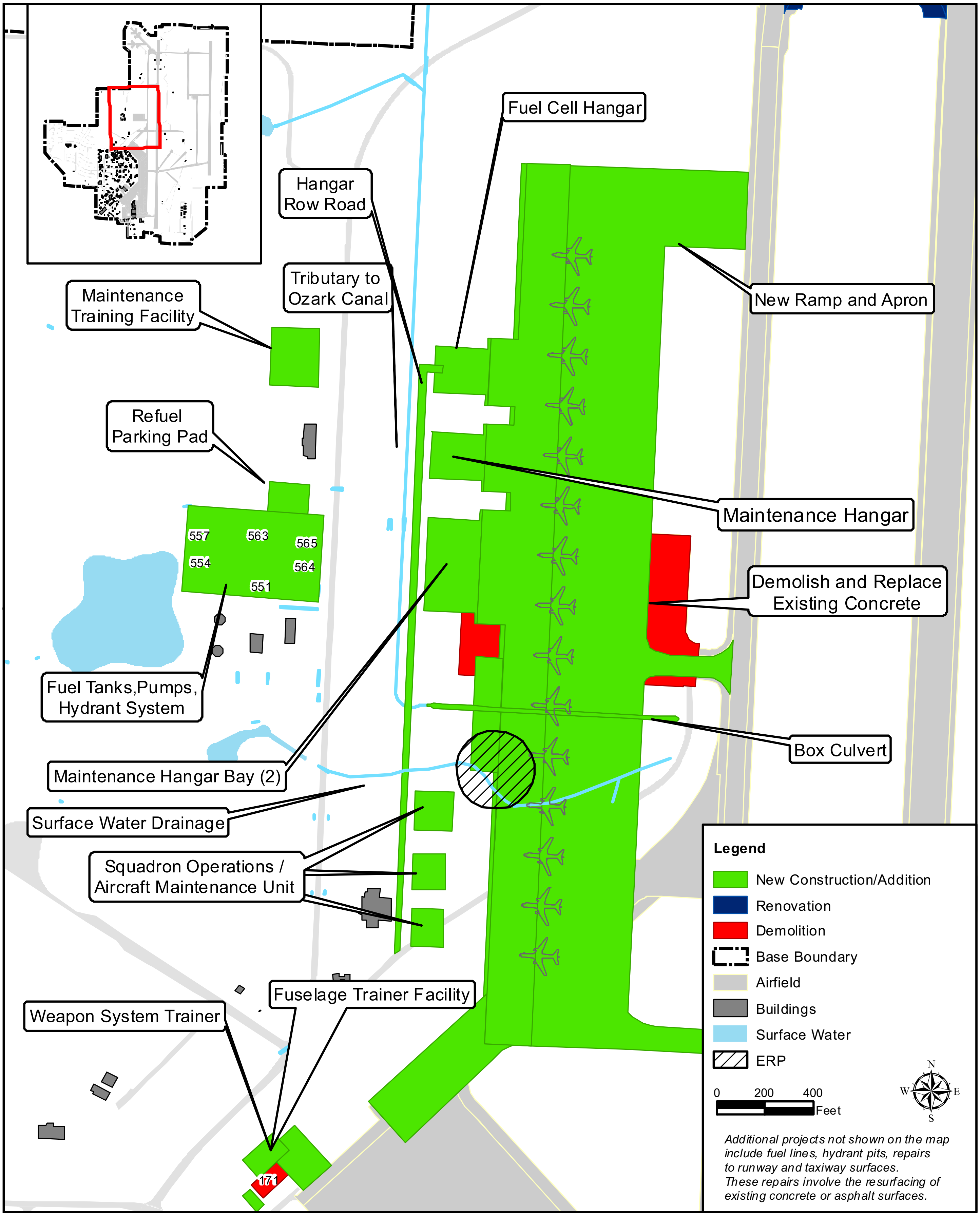
The overall facility requirements for the MOB 1 beddown are described in Section 2.3.2.1. Most of these requirements are met through existing infrastructure. However, the proposed MOB 1 beddown at Altus AFB would require new construction and demolition (C&D) of

facilities, as well as modifications to some existing facilities. The projects that would be necessary to support the KC-46A MOB 1 mission at Altus AFB are listed in Table 2-6.

Table 2-6. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Altus AFB

Project	Facility Size (Square Feet)
Demolition	
Building 82	10,663
Building 171	11,264
Building 551	1,319
Building 554	725
Building 557	725
Building 563	144
Building 564	1,968
Building 565	1,968
Ramp Area	480,000
Total Square Feet	**508,776**
Renovation	
Renovate Taxiway G and Reconstruct K-I	147,006
Repair Concrete Overrun	351,000
Building 87, Wing Headquarters (Operations Group, ANG, and AFRC)	101,552
Building 170, Aircraft Parts Storage/Contractor Supplies	<100
Building 285, Construct Interior Wall and Expand Hydraulic Shop	<100
Total Square Feet	**599,758**
New Construction	
Ramp Area and AGE Apron	2,500,000
Install Box Culvert in Existing Irrigation Canal	5,000
Refueling Truck Parking Yard	8,325
Hangar Row Road	104,400
Squadrons Operations Facility with AMU (3 buildings)	111,000
Maintenance Hangar with AME (2-bay)	95,768
Fuel Cell Hangar	64,972
Maintenance Hangar (2-bay)	127,728
Install Ramp Lighting	SF not applicable
Maintenance Training Facility (MTF)	44,300
Fuel Tanks, Pumps, Hydrant System	222,000
FuT Facility	10,600
Weapons System Trainer	26,100
Two Dormitories (96 rooms)	66,366
Visiting Quarters	63,100
Total Square Feet	**3,449,929**
Additions/Alterations	
Building 369, Add Vault	7,500
Building 156, Gym Addition	14,400
Total Square Feet	**21,900**

With the exception of the new ramp, taxiway lighting, refueling truck parking yard, and hangar row road, renovation and additions/alterations of buildings and repairs to existing runway overruns and taxiways would be conducted primarily on existing improved surfaces. The large new ramp area, refueling truck parking yard, and hangar row road would be constructed on unimproved land along the flightline (see Figures 2-6 and 2-7).



Path: H:\KC-46a\Bases\Altus\GIS\Projects\Figure 2-6 Physical Development for the KC-46A MOB 1 Beddown at Altus AFB Map 1_ARG 05232013 nat res rev [used ID_2_6].mxd

Figure 2-6. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Altus AFB - Map 1

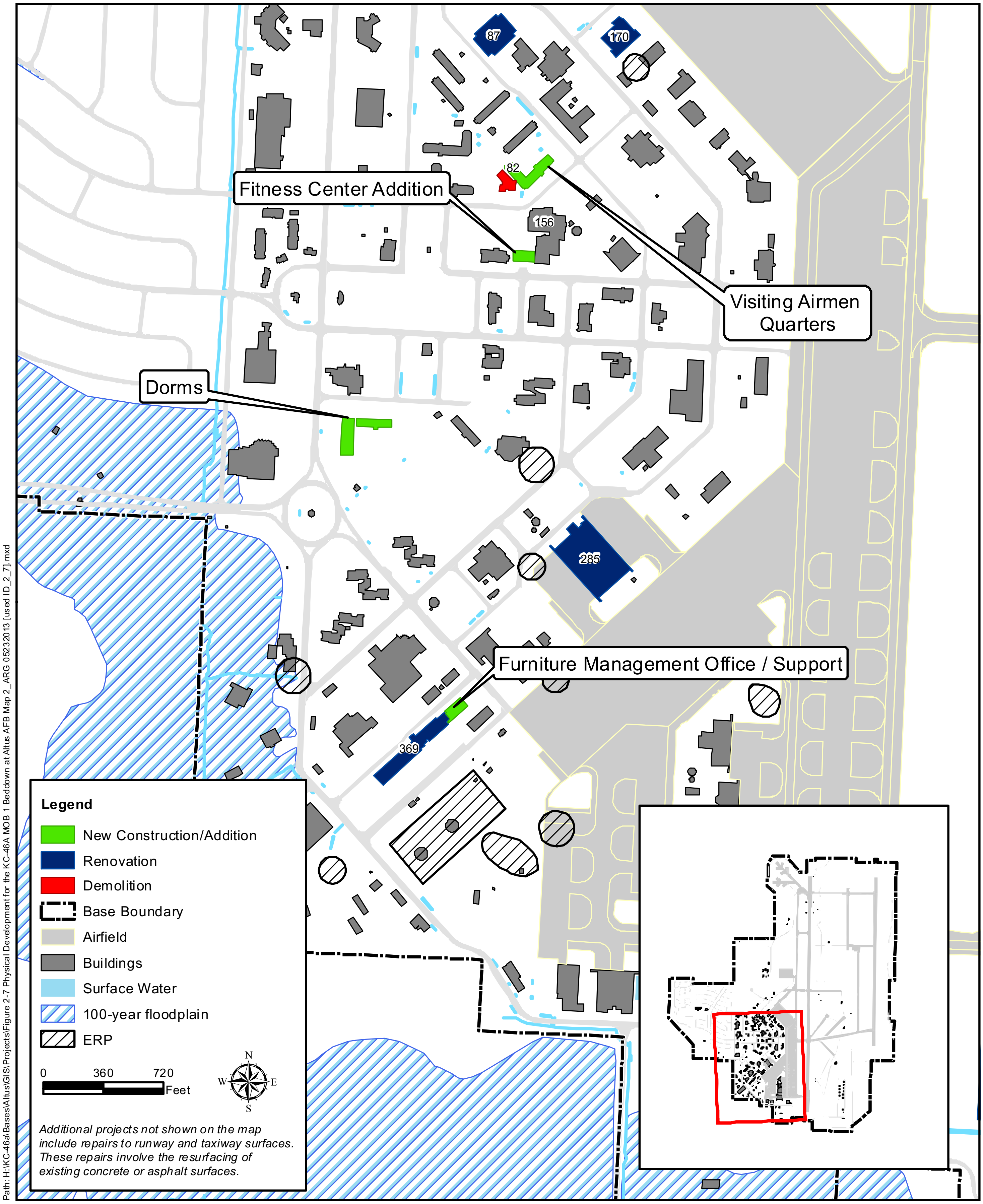


Figure 2-7. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Altus AFB - Map 2

Demolition of nine structures would involve the removal of about 12 acres of existing structure. Removal of the existing refueling equipment, two fuel storage tanks, and the north ramp hydrant fuel system is also included in the demolition plan.

Existing flight operations and refueling activities associated with the C-17 and KC-135 FTUs would continue during demolition and reconstruction activities.

A construction transition plan would be implemented for the taxiways, and overrun demolition and construction would be phased so as to not interfere with existing airfield operations. During demolition and construction of the new hydrant systems, additional refueling vehicles would be used to support the C-17 and KC-135 missions.

2.4.1.3.2 Personnel

The current personnel at Altus AFB and the projected increase necessary to support the KC-46A MOB 1 mission are provided in Table 2-7. As part of the MOB 1 mission, the AFRC would have an association with the active-duty component, as described below.

Because the MOB 1 mission at Altus AFB would be in addition to the existing missions, an increase in personnel would be anticipated. The KC-46A MOB 1 mission would require approximately 1,873 full-time military (includes 1,340 active-duty, 305 reserve, and 228 BOS) personnel, approximately 930 part-time reserve personnel, approximately 29 DoD civilian personnel, and approximately 20 contractors (categorized as “other base personnel”).

Table 2-7. Altus AFB KC-46A MOB 1 Scenario Personnel and Dependent Changes

Personnel	Baseline	KC-46A MOB 1 Scenario	Total
Military (full-time)	1,379	1,873	3,252
Military Dependents and Family Members	1,051	3,044[a]	4,095
Part-Time Reservists	19	930	949
Students	362	0	362
DoD Civilian	1,243	29	1,272
Other Base Personnel	907	20	927
Total	**4,961**	**5,896**	**10,857**

[a] Dependents estimated at 2.5 times 65 percent of full-time military personnel only.

About 1,051 military dependents, currently associated with the full-time military personnel at Altus AFB, live in communities surrounding the base. Approximately 3,044 family members and dependents would be anticipated to accompany the full-time military personnel associated with the KC-46A MOB 1 mission. Depending on the availability of housing in areas surrounding Altus AFB, the additional families associated with the KC-46A MOB 1 mission could need about 1,873 homes. These could either be existing houses in the communities surrounding the base or constructed new off base. To ascertain whether the required number of homes is available in the communities around Altus AFB, the USAF would conduct a Housing Requirements and Market Analysis (HRMA). This analysis would be completed if Altus AFB were selected to receive this mission.

2.4.1.3.3 Flight Operations

Table 2-8 provides a comparison of the number of annual airfield operations anticipated with the beddown of the KC-46A MOB 1 mission at Altus AFB to the existing baseline mission. The table shows that the total annual operations at Altus AFB would increase from 109,459 per year to 143,169, resulting in an approximate 31 percent increase in annual aircraft operations.

Table 2-8. Altus AFB Baseline and Projected Annual MOB 1 Scenario End-State Airfield Operations[a]

Aircraft	Unit Flying Days/Year	Baseline						Projected					
		Landings and Takeoffs		Closed Pattern[b]		Total		Landings and Takeoffs		Closed Pattern[b]		Total	
		Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual
C-17	240	41.98	10,075	172.78	41,467	214.76	51,542	41.98	10,075	172.78	41,467	214.76	51,542
KC-135	240	16.50	3,960	219.2	52,608	235.70	56,568	16.50	3,960	219.20	52,608	235.70	56,568
Transient[c]	240	2.84	682	2.78	667	5.62	1,349	2.84	682	2.78	667	5.62	1,349
KC-46A[d]	312[e]	0	0	0	0	0	0	17.60	5,630	90.00	28,080	107.60	33,710
	Total[f]	**61.32**	**14,717**	**394.76**	**94,742**	**456.08**	**109,459**	**78.92**	**20,347**	**484.76**	**122,822**	**563.68**	**143,169**

[a] An operation is the accomplishment of a single maneuver such as a takeoff/departure, an arrival/landing, or half of a closed pattern.
[b] A closed pattern consists of two operations: one takeoff and one landing. The numbers presented are operations.
[c] The primary transient aircraft types using Altus AFB include C-130, C-17, C-21, and T-38.
[d] Approximately 10 percent of the total KC-46A operations would occur during environmental night (10:00 P.M. to 7:00 A.M.).
[e] The annual total represents a combination of operations resulting from local training sorties, which occur 312 days per year, and mission sorties, which occur 365 days per year. The expected 475 mission sorties per year would not normally conduct closed pattern operations, whereas training sorties would conduct an average of approximately six closed patterns per sortie.
[f] The total operations in this table are a combination of all aircraft operations and are based on different numbers of flying days.

2.4.1.3.4 Auxiliary Airfields

The proposed MOB 1 mission at Altus AFB would not require the use of auxiliary airfields. The KC-46A aircraft would utilize the existing KC-135 flight tracks, fuel jettison areas, and AR tracks.

2.4.2 Fairchild Air Force Base (MOB 1)

The USAF is considering Fairchild AFB for the MOB 1 mission of 36 KC-46A aircraft. The classic association (active led, ANG supported) would continue if Fairchild AFB is selected for beddown of the MOB 1 mission.

Section 2.4.2.2 describes the personnel changes, physical and development changes, and airfield operations that would occur with implementation of the MOB 1 mission.

2.4.2.1 Fairchild AFB Overview

Fairchild AFB is located in Spokane County, Washington approximately 12 miles west of the City of Spokane, Washington (see Figure 2-8). Fairchild AFB hosts one northeast-to-southwest runway that is 13,899 feet long by 200 feet wide, and is one of only three active-duty KC-135 Stratotanker wings in the USAF. The host unit at Fairchild AFB is the 92 ARW assigned to the 18th Air Force (AF) of AMC. The mission of Fairchild AFB is to "Support America's War Fighters with Global Reach Airpower and Agile Combat Support" and to "Perform air refueling, airlift, and aeromedical evacuation missions supporting U.S. and coalition conventional operations and United States Strategic Command strategic deterrence missions."

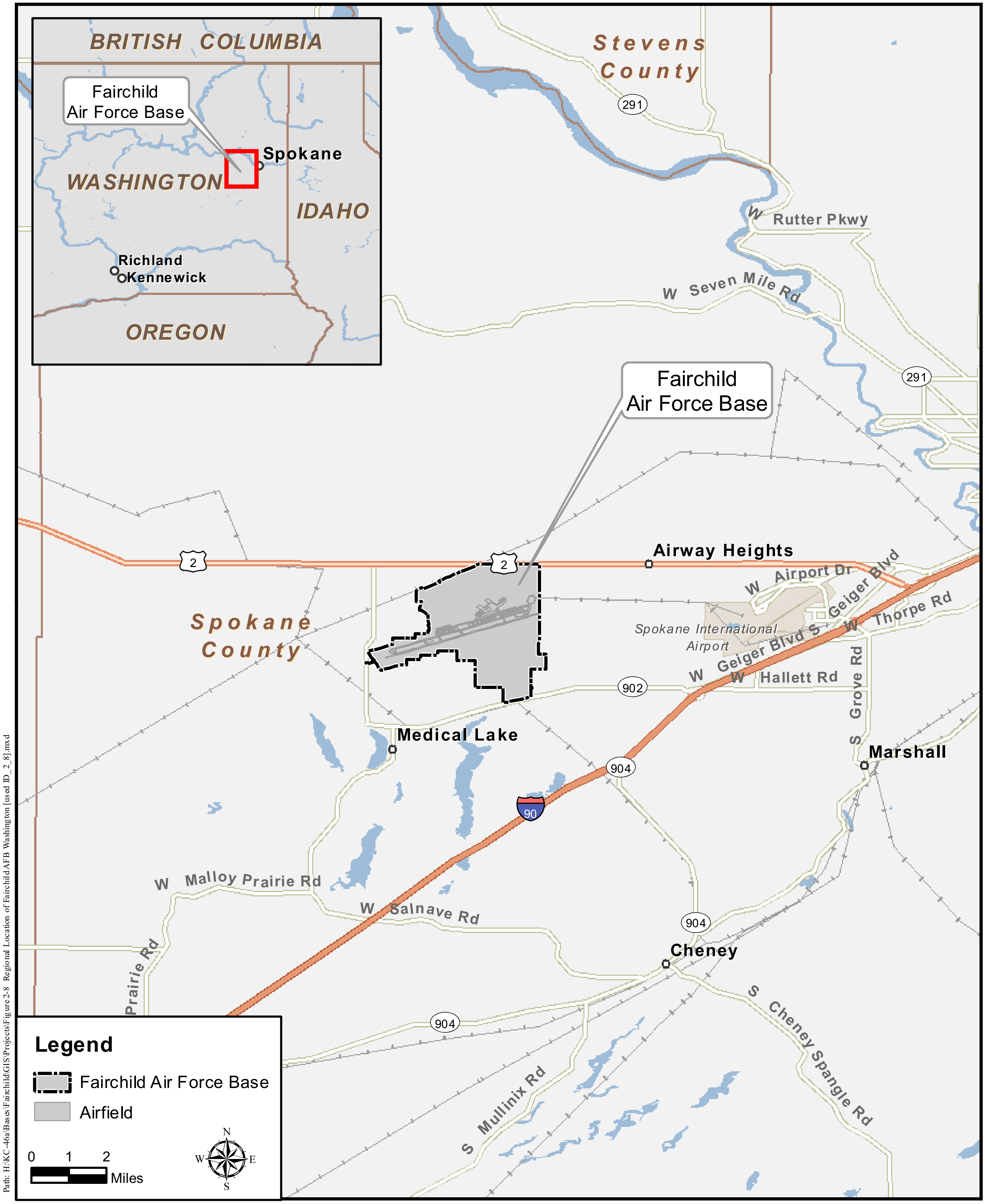


Figure 2-8. Regional Location of Fairchild AFB, Washington

Fairchild AFB covers approximately 4,551 acres of land and is home to a wide variety of units and missions. The most prominent mission is aerial refueling, but others include the USAF Survival, Evasion, Resistance, and Escape (SERE) School, Washington Air National Guard (WANG), AFRC, the Joint Personnel Recovery Agency (JPRA), medical detachments, and others.

Fairchild AFB was activated in March 1942 as the Spokane Army Air Depot. The depot served as a major repair center for World War II aircraft (mostly B-17 Flying Fortresses). Shortly after the conclusion of World War II, two bombardment wings (92nd and 98th Bombardment Wing [BMW]) were assigned to the base. These units flew the B-29 Superfortress. In July 1951, the base's name was changed to Fairchild AFB and the 92 BMW received the B-36 Peacemaker. In October 1957, the base converted to the B-52 Stratofortress and in February 1958, the first KC-135 Stratotanker arrived at Fairchild AFB. In 1960, Fairchild AFB received an Atlas missile launch complex, becoming the first base to have both manned aircraft and intercontinental ballistic missiles. The Atlas mission was deactivated in 1965, but the B-52s continued to fly at Fairchild AFB until 1994. When the B-52s left the base, the 92 BMW was redesignated the 92 ARW. The 92 ARW continues to fly the KC-135.

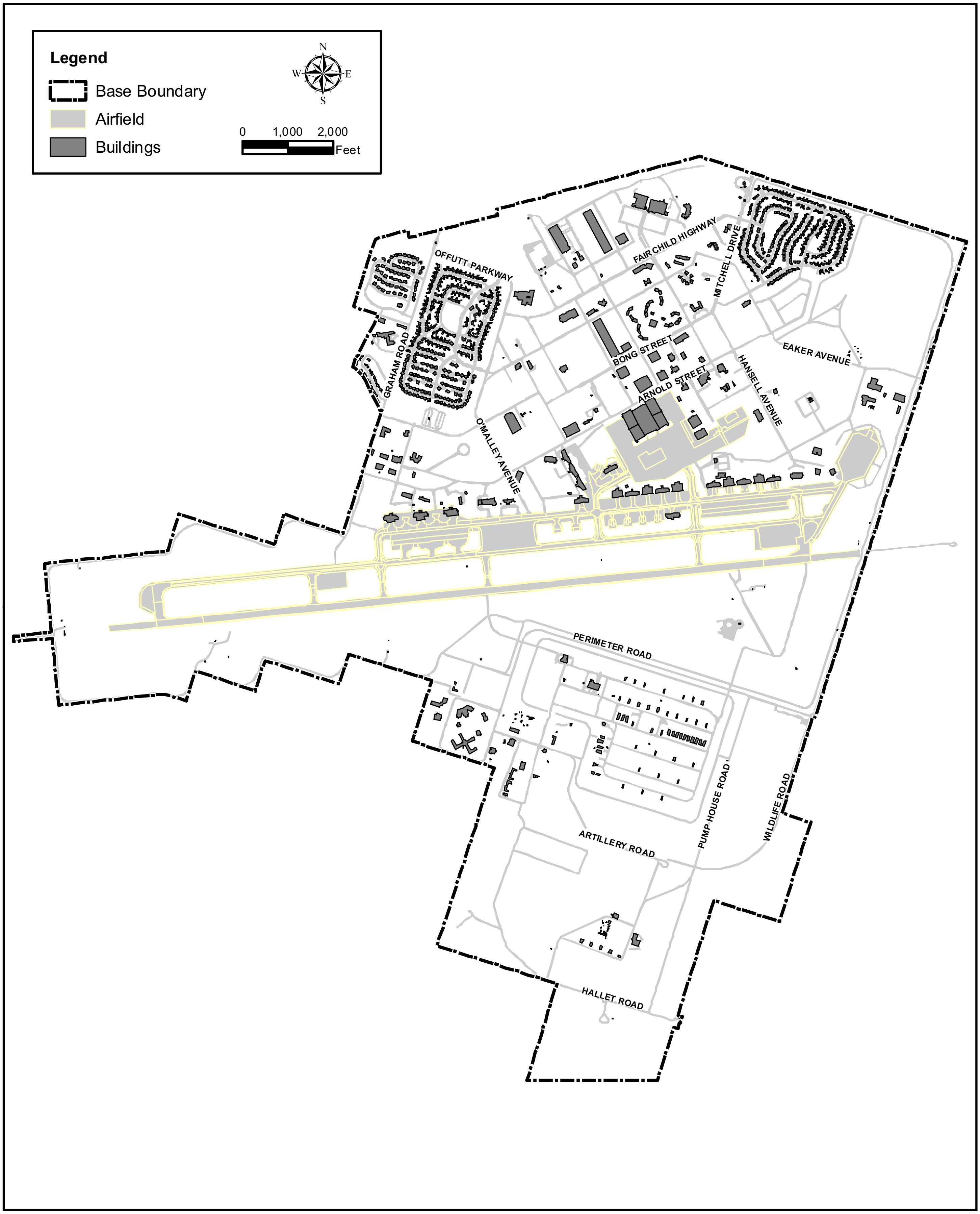
2.4.2.2 MOB 1 Beddown Specifics

This section details the actions that would occur at Fairchild AFB if selected to base 36 KC-46A aircraft for the MOB 1 mission. The MOB 1 mission would replace the existing KC-135 aerial refueling mission at Fairchild AFB and result in a net increase of six PAA. However, the SERE, JPRA, and KC-135 Weapons Instructor Course (WIC) missions would continue. The KC-135 WIC function would temporarily move from Building 2040 to Building 399. The WIC function comprises 23 military instructor/administrative personnel and a student throughput of 16 students per year. This function is responsible for 76 airfield annual sorties at Fairchild AFB and would continue regardless of the final KC-46A MOB 1 basing decision.

The USAF determined that Fairchild AFB's infrastructure and base resources could accommodate the basic requirements for a KC-46A MOB 1 mission within the constraints set by the alternative narrowing process described in Section 2.2. The overall layout of existing facilities and infrastructure at Fairchild AFB is shown on Figure 2-9.

2.4.2.2.1 Facilities and Infrastructure

The overall facility requirements for the MOB 1 beddown are described in Section 2.3.2.1. Most of these requirements are met through existing infrastructure. However, the proposed MOB 1 beddown at Fairchild AFB would require new C&D of facilities, as well as modifications to some existing facilities. The projects anticipated to be required to support the KC-46A MOB 1 mission at Fairchild AFB are listed in Table 2-9. The proposed redevelopment would take place within the previously disturbed cantonment area of Fairchild AFB (see Figure 2-10). The proposed apron and fuels upgrade project would be developed on areas of the flightline that are currently paved and unpaved.



Path: H:\KC-46a\Bases\Fairchild\GIS\Projects\Figure 2-9 Installation Overview Fairchild AFB [used ID_2_9].mxd

Figure 2-9. Base Overview of Fairchild AFB

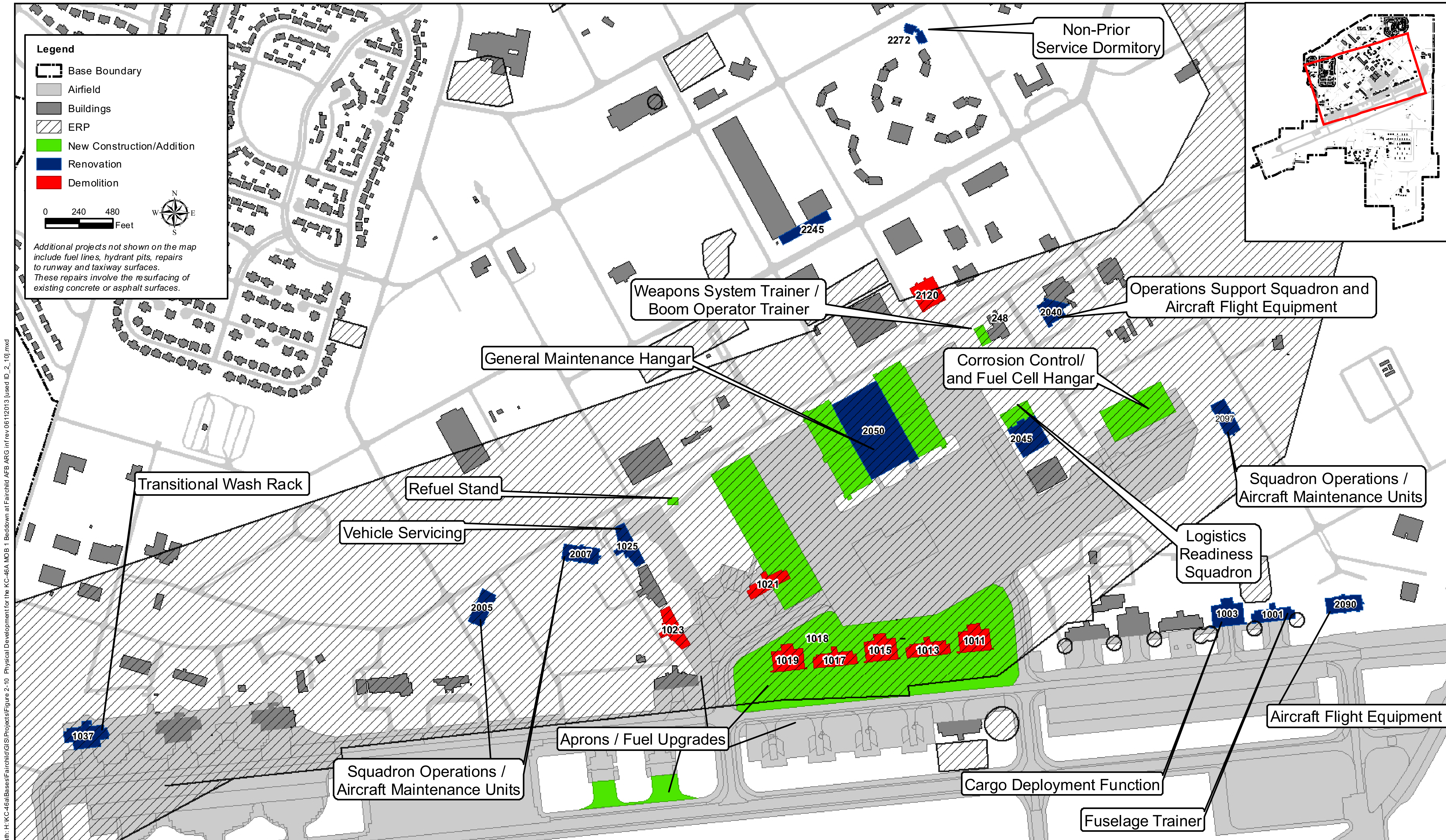


Figure 2-10. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Fairchild AFB

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Table 2-9. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Fairchild AFB

Project	Facility Size (Square Feet)
Demolition[a]	
Building 1011	32,664
Building 1013	27,747
Building 1015	32,664
Building 1017	27,875
Building 1018	1,881
Building 1019	37,278
Building 2120	28,200
Total Square Feet	**188,309**
Renovation[b]	
Building 1001, FuT	27,749
Building 1003, Cargo Deployment Function	36,664
Building 1025, Vehicle Servicing	26,681
Building 1037, Transitional Wash Rack	39,977
Building 2005, Squad Ops and AMU	38,308
Building 2007, Squad Ops and AMU	38,300
Building 2040, Operations Support Squadron and Aircraft Flight Equipment	15,800
Building 2050, General Maintenance Hangar	474,182
Building 2090, Aircraft Flight Equipment	36,603
Building 2097, Squad Ops and AMU	40,600
Building 2272, Dormitory Conversion	23,755
Building 2245	57,027
Roads and Parking Upgrades	44,882
Repair Taxiways A, B, C, D, E, F, and P (resurfacing of existing pavements)	1,168,788
Total Square Feet	**2,068,316**
New Construction	
Corrosion Control and Fuel Cell Hangar	145,626
Maintenance Training Facility	44,355
New Aprons and Fuels Upgrade (decommission of old hydrant loop and installation of new)	1,420,056
Fuel Stand (remove former stand and reconstruct)	3,560
Total Square Feet	**1,613,597**
Additions/Alterations	
Building 2045, Logistics Readiness Squadron	20,000
Building 2048, WSTs, BOT	12,500
Total Square Feet	**32,500**

[a] Demolition of Buildings 1021 and 1023 are required for new construction. These buildings were evaluated under a previous environmental assessment, are already scheduled for demolition, and would be demolished with or without the KC-46A beddown.
[b] Buildings 1024 and 1026 would be used to house KC-46A personnel, but no renovations are required.

2.4.2.2.2 Personnel

The current personnel at Fairchild AFB and the projected increase necessary to support the KC-46A MOB 1 mission are provided in Table 2-10. Currently, the base has approximately 6,400 personnel, including military, part-time Guardsmen, DoD civilians, and contractors. The ANG would have an association with the active-duty component, as shown in Table 2-10.

The KC-46A MOB 1 mission would require approximately 1,656 full-time military (includes 1,348 active-duty, 288 reserve, and 20 BOS) personnel, approximately 374 part-time Guardsmen, and approximately 20 contractors (categorized as "other base personnel").

Table 2-10. Fairchild AFB KC-46A MOB 1 Scenario Personnel and Dependent Changes

Personnel	Baseline	KC-46A MOB 1 Scenario	KC-135 Drawdown	Change	Total
Military (full-time)	3,334	1,656	-1,239	417	3,751
Military Dependents and Family Members	3,906	2,691[a]	-2,013[a]	678	4,584
Part-Time Guardsmen	1,354	374	-339	35	1,389
DoD Civilian	531	25	-24	1	532
Other Base Personnel	621	20	0	20	641
Total	**9,746**	**4,766**	**-3,615**	**1,151**	**10,897**

[a] KC-46A and drawdown KC-135 dependents estimated at 2.5 times 65 percent of full-time military personnel only.

About 3,900 military dependents are currently associated with the full-time military personnel at Fairchild AFB. In addition, dependents of the non-military personnel live in the surrounding communities. The projected new military personnel are expected to be accompanied by 2,691 dependents.

2.4.2.2.3 Flight Operations

Table 2-11 provides a comparison of the number of annual airfield operations anticipated with the beddown of the KC-46A MOB 1 mission at Fairchild AFB to the existing KC-135 mission. The table shows that the total annual operations at Fairchild AFB would increase from 30,507 per year to 49,303, resulting in an approximate 62 percent increase in annual aircraft operations.

Table 2-11. Fairchild AFB Baseline and Projected Annual MOB 1 Scenario End-State Airfield Operations[a]

Aircraft	Unit Flying Days/Year	Baseline						Projected					
		Landings and Takeoffs		Closed Pattern[b]		Total		Landings and Takeoffs		Closed Pattern[b]		Total	
		Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual
KC-135[c]	260	11.34	2,948	46.02	11,965	57.36	14,914	0	0	0	0	0	0
UH-60	260	10.01	2,603	5.54	1,440	15.55	4,043	10.01	2,603	5.54	1,440	15.55	4,043
UH-1N	260	3.17	824	16.80	4,368	19.97	5,192	3.17	824	16.80	4,368	19.97	5,192
Transient[d]	365	5.34	1,949	12.08	4,409	17.42	6,358	5.34	1,949	12.08	4,409	17.42	6,358
KC-46A[e]	312[f]	0	0	0	0	0	0	17.60	5,630	90.00	28,080	107.60	33,710
Total[g]		**29.86**	**8,324**	**80.44**	**22,183**	**110.30**	**30,507**	**36.12**	**11,006**	**124.42**	**38,297**	**160.54**	**49,303**

[a] An operation is the accomplishment of a single maneuver, such as a takeoff/departure, an arrival/landing, or half of a closed pattern.
[b] A closed pattern consists of two operations: one takeoff and one landing. The numbers presented are operations.
[c] A minor number of KC-135 sorties associated with the WIC could continue with the implementation of the MOB 1 scenario.
[d] The primary transient aircraft types using Fairchild AFB include C-12, C-130, C-17, C-9, EA-6B, F-16, F-18A/C, KC-135, and P-3C. There is also some use of Fairchild AFB by helicopters and piston aircraft (types unidentified).
[e] Approximately 10 percent of the total KC-46A operations would occur during environmental night (10:00 P.M. to 7:00 A.M.).
[f] The annual total represents a combination of operations resulting from local training sorties, which occur 312 days per year, and mission sorties, which occur 365 days per year. The expected 475 mission sorties per year would not normally conduct closed pattern operations, whereas training sorties would conduct an average of approximately six closed patterns per sortie.
[g] The total operations in this table are a combination of all aircraft operations and are based on different numbers of flying days.

2.4.2.2.4 Auxiliary Airfields

The proposed MOB 1 mission at Fairchild AFB would not require the use of auxiliary airfields but would utilize the existing KC-135 flight tracks, fuel jettison areas, and AR tracks.

2.4.3 Grand Forks Air Force Base (MOB 1)

The USAF is considering Grand Forks AFB for the MOB 1 mission of 36 KC-46A aircraft. Section 2.4.3.2 describes the personnel changes, physical and development changes, and airfield operations associated with implementation of the MOB 1 mission.

2.4.3.1 Grand Forks AFB Overview

Grand Forks AFB is located in Grand Forks County near the North Dakota-Minnesota border at the junction of Red Lake River and the Red River of the North (see Figure 2-11). The base is north of and adjacent to the City of Emerado and is 15 miles west of the City of Grand Forks. The City of Grand Forks is approximately 75 miles north of Fargo, North Dakota, and approximately 145 miles south of Winnipeg, Manitoba, in Canada. Grand Forks AFB hosts one north-to-south runway that is 12,350 feet long by 150 feet wide. Figure 2-12 shows an overhead view of the base.

The host unit at Grand Forks AFB is the 319th Air Base Wing (ABW) assigned to the Expeditionary Center of AMC. The 319 ABW provides base operating and direct operational support to wing personnel, three tenant units, and nine geographically separated units. Grand Forks AFB trains, deploys, and redeploys more than 1,300 Airmen in support of the Air Expeditionary Force and combatant commander requirements. Tenant groups include the Department of Homeland Security (DHS) operating the MQ-9 Reaper remotely piloted aircraft (RPA), the 69th Reconnaissance Group, and the 372nd Training Squadron.

Grand Forks AFB was established in 1954, when the USAF announced plans to build an Air Defense Command fighter-interceptor base in eastern North Dakota. In 1956, the USAF announced it would also utilize Grand Forks AFB to support SAC bombers and tankers. In 1960, Air Defense Command stationed the F-101 Voodoo fighter-interceptor squadron at Grand Forks AFB, along with the first KC-135 aerial refueling squadron. In 1962, the B-52 Stratofortress bomber arrived at Grand Forks AFB. In the mid-1960s, SAC organized a strategic missile wing at Grand Forks AFB and began construction on a Minuteman II missile complex, which became operational in December 1966. In 1987, the B-52 aircraft were replaced by the newer and more capable B-1B Lancer strategic bomber, while the KC-135A Stratotankers were replaced by the KC-135R models. Heavy bomber operations at Grand Forks AFB ended with the last B-1B Lancer departing the base on 26 May 1994. The 2005 Base Realignment and Closure (BRAC) directed the realignment of all KC-135 aircraft to other AFBs, and, in 2010, the last KC-135 aircraft departed Grand Forks AFB. This final KC-135 flight marked the end of 50 years of aerial refueling operations at the base and the culmination of 53 years of flying operations. In early 2009, the DHS's Customs and Border Protection became a tenant organization at Grand Forks AFB and brought its RPA program to the base. In late December 2010, ACC initiated RQ-4 Global Hawk operations and the 119 ABW initiated MQ-1 Predator operations in fulfillment of the 2005 BRAC recommendation for future operations at Grand Forks AFB. The first Global Hawk RPA arrived at Grand Forks AFB in June 2011.

2.4.3.2 MOB 1 Beddown Specifics

This section details the actions necessary at Grand Forks AFB if selected for the basing of the KC-46A MOB 1 mission. The MOB 1 mission would be in addition to the three existing RPA missions at Grand Forks AFB. The USAF determined that Grand Forks AFB's infrastructure and base resources could accommodate the basic requirements for a KC-46A MOB 1 mission within the constraints set by the alternative narrowing process described in Section 2.2.

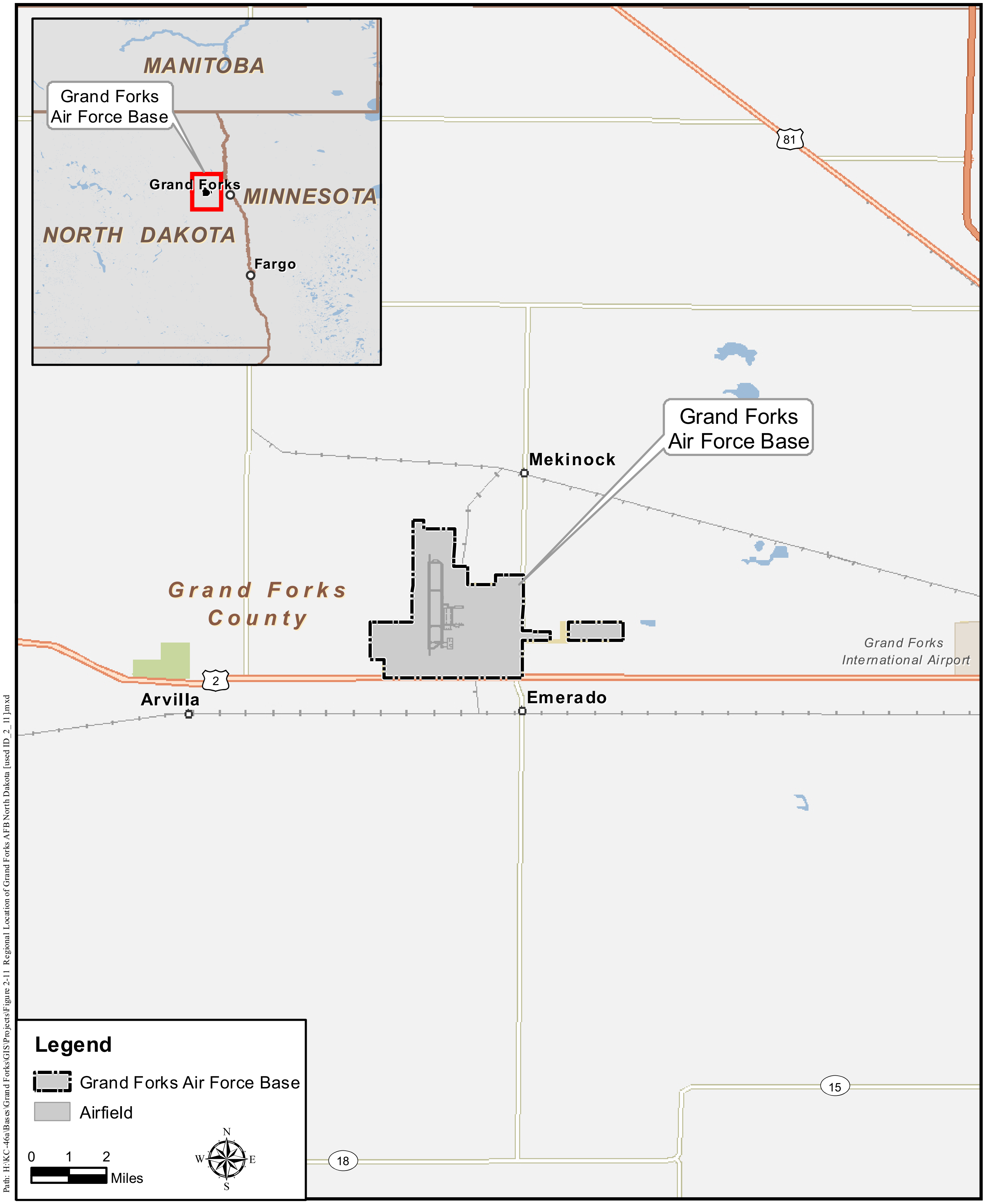

Figure 2-11. Regional Location of Grand Forks AFB, North Dakota

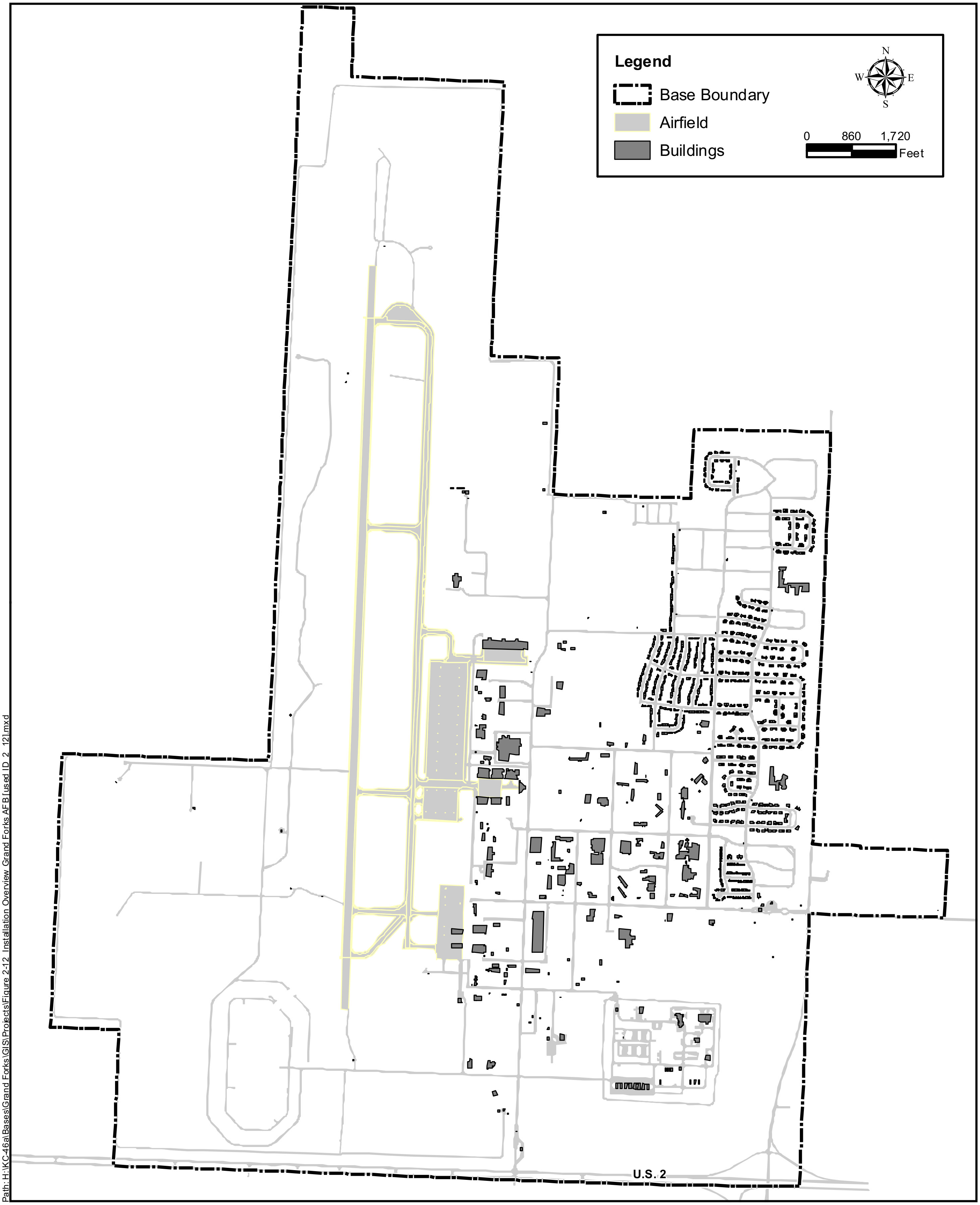

Figure 2-12. Base Overview of Grand Forks AFB

2.4.3.2.1 Facilities and Infrastructure

The overall facility requirements for the MOB 1 beddown are described in Section 2.3.2.1. Grand Forks AFB has the physical real estate and infrastructure to beddown the KC-46A MOB 1 scenario; however, some of the anticipated projects required to support the KC-46A MOB 1 scenario at Grand Forks AFB are listed in Table 2-12. Some of the existing facilities, airfield ramp space, and hangars are currently utilized for day-to-day RPA missions. Due to ongoing base operations and the KC-46A aircraft mission requirements, new construction, additions, and renovations would be required to beddown the KC-46A (see Figure 2-13).

Table 2-12. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Grand Forks AFB

Project	Project Size (Square Feet)
Demolition	
Building 531	3,731
Building 635[a]	6,106
Total Square Feet	**9,837**
Renovation	
Building 221, Dormitory	26,265
Building 307, ANG Wing Headquarters	2,100
Building 528, Base Operations	2,100
Building 602, RPA Wing	27,172
Building 607, Operation Group/Operations Support Squadron/Aircraft Maintenance Squadron	37,286
Building 629, Squad Ops/AMU	3,359
Building 631, Squad Ops/AMU	3,359
Building 670, Supply Shop	N/A - Renovations consist of the installation of a cage for segregated storage.
Runway and Overrun Repairs	18,829,628
Roads and Parking Upgrades	Undetermined
Parking Apron/Fuels Hydrant Upgrade	830,184
Taxiway A, F, G Renovations	596,978
Total Square Feet	**20,358,431**
Additions/Alterations	
Building 556, Flight Stimulator (WSTs, BOT)	32,475
Building 622, Composite Shop	8,500
Building 649, General Maintenance Hangar (3-bay)/AME	334,644
Building 661, AGE	28,000
Total Square Feet	**403,619**
New Construction	
Fuel Cell/Corrosion Control (2-bay)/General Maintenance Hangar (1-bay) with Apron	216,225
New Taxiway and Parking Apron	542,750
Global Hawk Engine Pad (required for displaced Global Hawk)	38,695
Maintenance Training Facility	47,300
Squad Ops/AMU	40,600
AFE Facility	18,000
Dormitory	33,318
FuT Facility	10,600
Airfield Lighting Vault	4.787
Total Square Feet	**952,275**

[a] Demolish building to construct new AGE.

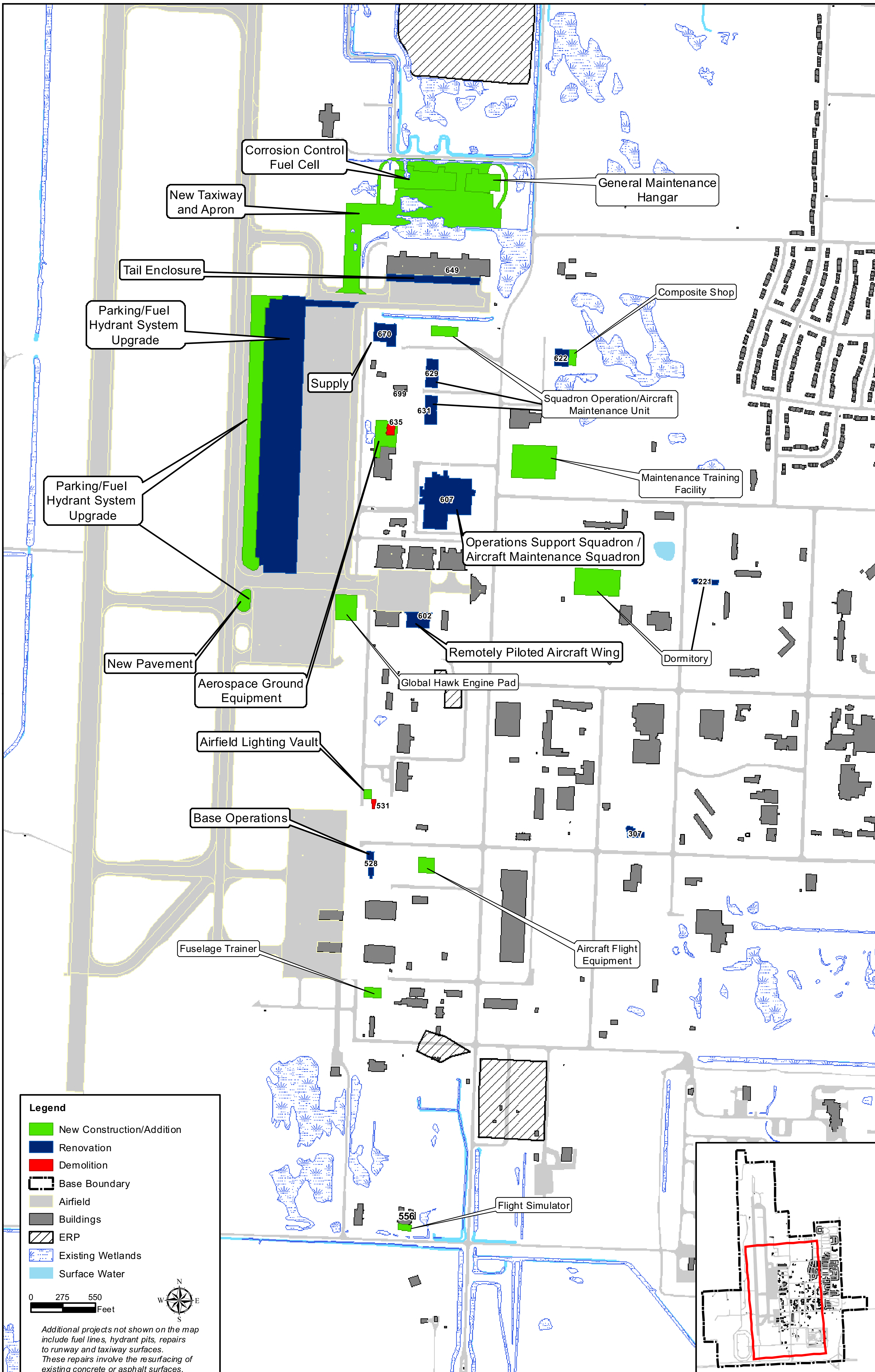

Figure 2-13. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at Grand Forks AFB

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New construction would include a Fuel Cell/Corrosion Control/General Maintenance Hangar; an MTF; an FuT facility; an AFE facility; a new Global Hawk Engine Pad to support the displacement by KC-46A parking; and adequate ramp, taxiway and fuel hydrant systems, as well as repairs required to the taxiways and runway (see Figure 2-13). The proposed redevelopment would take place within the previously disturbed cantonment area of the base.

Existing RPA flight operations and missions would need to continue during demolition and reconstruction activities. A construction transition plan would be implemented, where the taxiway demolition and construction would be phased to not interfere with existing airfield operations.

2.4.3.2.2 Personnel

The current personnel at Grand Forks AFB and the projected increase necessary to support the KC-46A MOB 1 mission are provided in Table 2-13. Currently, the base has about 2,500 personnel, including military, government civilians, and contractors. The ANG would have an association with the active-duty component, as indicated in Table 2-13.

Table 2-13. Grand Forks AFB KC-46A MOB 1 Scenario Personnel and Dependent Changes

Personnel	Baseline	KC-46A MOB 1 Scenario	Total
Military (full-time)	1,531	1,724	3,255
Military Dependents and Family Members	1,614	2,802[a]	4,416
Part-Time Guardsmen	0	659	659
DoD Civilian	303	3	306
Other Base Personnel	679	20	699
Total	**4,127**	**5,208**	**9,335**

[a] Dependents estimated at 2.5 times 65 percent of full-time military personnel only.

Because the MOB 1 mission at Grand Forks AFB would be in addition to the existing missions, an increase in personnel would be anticipated. The KC-46A MOB 1 mission would require approximately 1,724 full-time military (includes 1,334 active-duty, 288 reserve, and 102 BOS) personnel, approximately 659 part-time Guardsmen, approximately three DoD civilian personnel, and approximately 20 contractors (categorized as “other base personnel”).

About 1,614 military dependents currently associated with the full-time military personnel at Grand Forks AFB live in communities surrounding Grand Forks AFB. Approximately 2,802 dependents and family members would be anticipated to accompany the full-time military personnel associated with the KC-46A MOB 1 mission.

Depending on the availability of housing in areas surrounding Grand Forks AFB, the additional families associated with the KC-46A MOB 1 mission could need additional homes. These could either be existing houses in the communities surrounding the base or constructed new on or off base. In order to understand if these homes are available in the communities around Grand Forks AFB, the USAF would conduct an HRMA. This analysis would be completed if Grand Forks AFB were selected to receive this mission.

2.4.3.2.3 Flight Operations

Table 2-14 provides a comparison of the number of annual airfield operations anticipated with the beddown of the KC-46A MOB 1 mission at Grand Forks AFB to the existing baseline mission. The table shows that the total annual operations at Grand Forks AFB would increase from 14,946 per year to 48,656, resulting in an approximate 226 percent increase in annual aircraft operations.

Table 2-14. Grand Forks AFB Baseline and Projected Annual MOB 1 Scenario End-State Airfield Operations[a]

Aircraft	Unit Flying Days/ Year	Baseline						Projected					
		Landings and Takeoffs		Closed Pattern[b]		Total		Landings and Takeoffs		Closed Pattern[b]		Total	
		Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual
Predator (MQ-1)	156	2.00	312	28.00	4,368	30.00	4,680	2.00	312	28.00	4,368	30.00	4,680
Reaper (MQ-9)	260	2.00	520	35.00	9,100	37.00	9,620	2.00	520	35.00	9,100	37.00	9,620
Global Hawk (RQ-4)	130	2.00	260	1.00	130	3.00	390	2.00	260	1.00	130	3.00	390
Transient[c]	365	0.70	256	0.00	0	0.70	256	0.70	256	0.00	0	0.70	256
KC-46A[d]	312[e]	0.00	0	0.00	0	0.00	0	17.60	5,630	90.00	28,080	107.60	33,710
Total[f]		**6.70**	**1,348**	**64.00**	**13,598**	**70.70**	**14,946**	**24.30**	**6,978**	**154.00**	**41,678**	**178.30**	**48,656**

[a] An operation is the accomplishment of a single maneuver, such as a takeoff/departure, an arrival/landing, or half of a closed pattern.
[b] A closed pattern consists of two operations: one takeoff and one landing. The numbers presented are operations.
[c] The primary transient military aircraft types using Grand Forks AFB include KC-135, C-20, C-21, C-130, KC-10, and C-12.
[d] Approximately 10 percent of the total KC-46A operations would occur during environmental night (10:00 P.M. to 7:00 A.M.).
[e] The annual total represents a combination of operations resulting from local training sorties, which occur 312 days per year, and mission sorties, which occur 365 days per year. The expected 475 mission sorties per year would not normally conduct closed pattern operations, whereas training sorties would conduct an average of approximately six closed patterns per sortie.
[f] The total operations in this table are a combination of all aircraft operations and are based on different numbers of flying days.
Key: CBP – U.S. Customs and Border Protection

2.4.3.2.4 Auxiliary Airfields

The proposed MOB 1 mission at Grand Forks AFB would not require the use of auxiliary airfields but would utilize the former KC-135 flight tracks, fuel jettison areas, and AR tracks.

2.4.4 McConnell Air Force Base (FTU or MOB 1)

The USAF is considering two different actions for McConnell AFB. One action includes the beddown of one FTU squadron by AETC with up to eight KC-46A aircraft. A second action, for which McConnell AFB has been selected as the Preferred Alternative, would be the beddown of three squadrons by AMC with 36 KC-46A aircraft for the MOB 1 scenario. These are separate actions; McConnell AFB would only be selected for the implementation of one of these actions (as described in Chapter 1). The classic association (active led, AFRC supported) would continue if McConnell AFB is selected for beddown of the KC-46A FTU or MOB 1 scenario.

Section 2.4.4.2 describes the personnel changes, physical and development changes, airfield operations, and changes in use of auxiliary airfields that would occur with implementation of the FTU scenario. Section 2.4.4.3 describes changes that would occur with implementation of the MOB 1 scenario. No auxiliary airfields would be used as part of the MOB 1 scenario.

2.4.4.1 McConnell AFB Overview

McConnell AFB is located in Sedgwick County, Kansas, approximately six miles southeast of Wichita, Kansas (see Figure 2-14). The host unit at McConnell AFB is the 22nd ARW assigned to the 18 AF of AMC. The mission of the 22 ARW is to deliver total force mission ready Airmen and KC-135 Stratotanker mobility to combatant commanders through robust installation support anytime and anywhere. In addition to the 22 ARW, McConnell AFB is home to the Kansas Air National Guard (KANG). McConnell AFB covers approximately 2,651 acres of land and is one of only three active-duty KC-135 Stratotanker wings in the USAF.

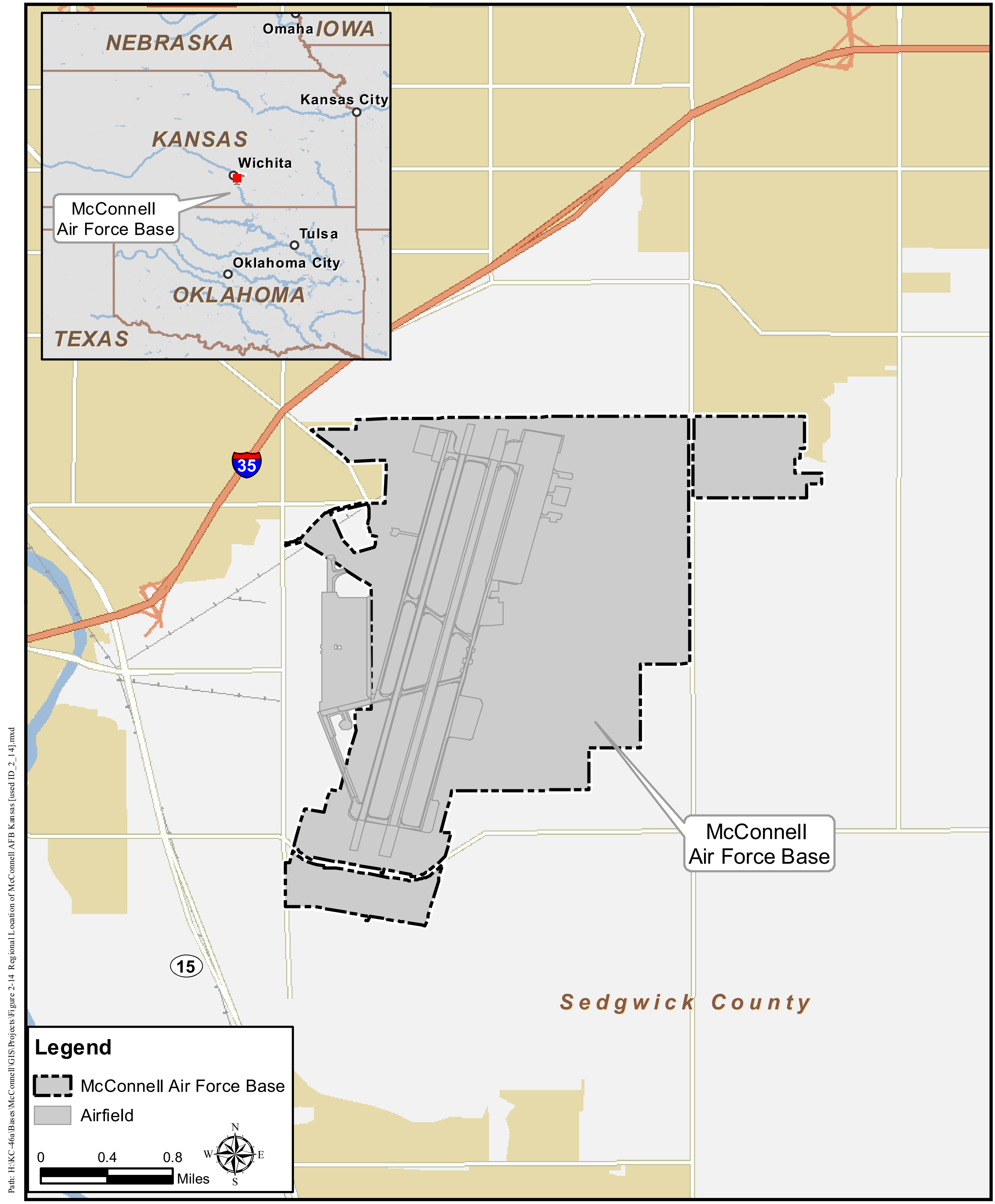


Figure 2-14. Regional Location of McConnell AFB, Kansas

The other two KC-135 Stratotanker wings are located at Fairchild AFB in Washington and MacDill AFB in Florida. McConnell AFB hosts two northeast-to-southwest runways. The primary runway (01L/19R) is under reconstruction and will be 12,000 feet long by 150 feet wide. The second runway is 12,000 feet long by 300 feet wide. The base overview of McConnell AFB is shown on Figure 2-15.

McConnell AFB originated with joint municipal-military use of Wichita Municipal Airport in the 1940s. The 127th Observation Squadron of Kansas National Guard was activated in 1941 as the first military unit. The USAF named the airport Wichita AFB in 1951, and later renamed it McConnell AFB in 1954. McConnell AFB has served as home for a variety of missions over the years, including the B-47 Stratojet bomber, the Titan missile mission, F-16, and the B-1 bomber. The B-1 aircraft were transferred to other bases in 2002. As a result of this transfer, the 184th Bomb Wing was redesignated as the 184 ARW. This officially established McConnell AFB as the sole base in the USAF where all three components (Active, Guard, and Reserve) supported the same mission. In April 2008, the 184 ARW was designated the 184 IW, making it the first IW in the ANG (McConnell AFB 2011a).

The McConnell AFB PAA consists of 44 KC-135 aircraft. The final budget for fiscal year 2013 downsized the PAA at McConnell AFB from 48 to 44 aircraft. Currently, there is a classic association (active led, AFRC supported) within the existing KC-135 squadrons at McConnell AFB. The 22 ARW includes four major units: the 22nd Maintenance Group, the 22nd Medical Group, the 22nd Mission Support Group, and the 22nd Operations Group. The 931st Air Refueling Group (ARG) of the AFRC is an associate unit and the 184 IW of the KANG is a tenant unit. In addition, the 22 ARW provides administrative, medical, and logistical support for other tenant agencies and the McConnell AFB community.

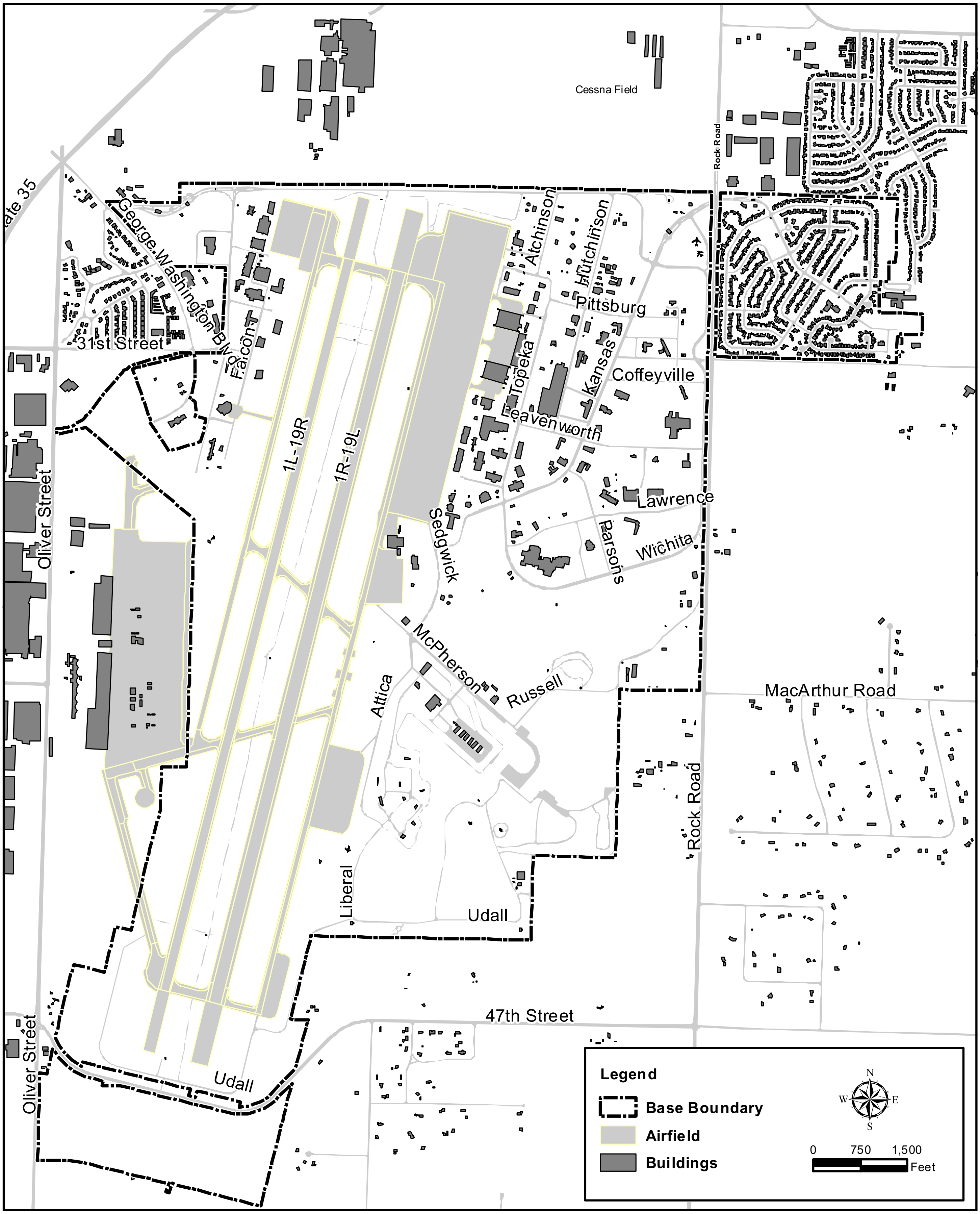
2.4.4.2 FTU Beddown Specifics

The USAF determined that McConnell AFB's infrastructure and base resources could accommodate the basic requirements for the KC-46A FTU scenario within the constraints set by the alternative narrowing process described in Section 2.2. This section details the actions that would occur at McConnell AFB if the base were selected for the basing of the KC-46A FTU scenario. The FTU scenario would be additive to the current mission at McConnell AFB, and the first four of up to eight aircraft would arrive in 2016.

2.4.4.2.1 Facilities and Infrastructure

The overall facility requirements for the FTU beddown are described in Section 2.3.1.1. Although some of the requirements are met through existing infrastructure, some demolition, construction, and modification/additions to existing facilities, and infrastructure modifications would be required to support KC-46A FTU training operations. Table 2-15 lists the KC-46A FTU-related projects that would take place within the previously disturbed cantonment area, as shown on Figure 2-16.

Existing flight operations and refueling activities associated with the KC-135 mission would continue during demolition and reconstruction activities. A construction transition plan would be implemented, where the taxiway demolition and construction would be phased to not interfere with existing airfield operations. During demolition and construction of the new hydrant systems, additional refueling vehicles would be used to maintain the KC-135 mission.



Path: H:\KC-46a\Bases\McConnell\GIS\Projects\Figure 2-15 Installation Overview McConnell AFB [used ID_2_15].mxd

Figure 2-15. Base Overview of McConnell AFB

Table 2-15. Facilities and Infrastructure Projects for the KC-46A FTU Scenario at McConnell AFB

Project	Facility Size (Square Feet)
Demolition	
Building 977[a]	1,891
Building 978[a]	25,388
Building 984[a]	655
Building 985[a]	400
Building 1110[b]	7,144
Building 1122[b]	168
Total Square Feet	**35,646**
Renovation	
Airfield/Runway Taxiway D Repair[d]	125,676
Parking Ramp Apron Type III Fuel Hydrant System Upgrade	N/A
Building 840, (Squad Ops) and AFE[c]	24,700
Building 1169, Logistics Readiness Squadron Facility (storage only)	N/A
Total Square Feet	**152,686**
New Construction	
Fuel Cell and Corrosion Control Maintenance Hangar (2-bay) AMU /Maintenance Back Shops	145,626
FuT Facility	45,690
FTC	51,352
Total Square Feet	**242,668**
Additions/Alterations	
Building 1129, Composite Repair Facility (back shops)	8,500
Building 1170, Director of Maintenance Office	560
Alpha Ramp Deicing Pad Expansions and Supporting Infrastructure	49,900
Total Square Feet	**58,960**

[a] Demolition of building is required to locate the new KC-46A hangar.
[b] Demolition of building is required to locate the new FuT Facility. Demolition analyzed under previous Categorical Exclusion.
[c] AFE would also be housed in Buildings 1183 and 1186.
[d] Taxiway F also requires repairs; however, this project was addressed in the 2012 Installation Development Environmental Assessment.

2.4.4.2.2 Personnel

The current personnel at McConnell AFB and the projected increase necessary to support the KC-46A FTU mission are provided in Table 2-16. Not counting personnel from the KANG 184 IW or from the 931 ARG, the base has about 4,800 personnel, including military, part-time reserve, government civilians, and contractors. The ADSL proposed for the KC-46A FTU would be 200. Because the FTU mission at McConnell AFB would be in addition to the existing mission, an increase in personnel would be anticipated. The KC-46A FTU mission would require approximately 141 full-time military (includes 119 active-duty, 12 reserve, and 10 BOS) personnel, approximately 20 part-time reserve personnel, approximately 315 DoD civilian personnel, and approximately 23 contractors (categorized as “other base personnel”).

About 3,220 military dependents, currently associated with the full-time military personnel at McConnell AFB, live in communities surrounding the base. Approximately 229 family members and dependents would be anticipated to accompany the full-time military personnel associated with the KC-46A FTU mission.

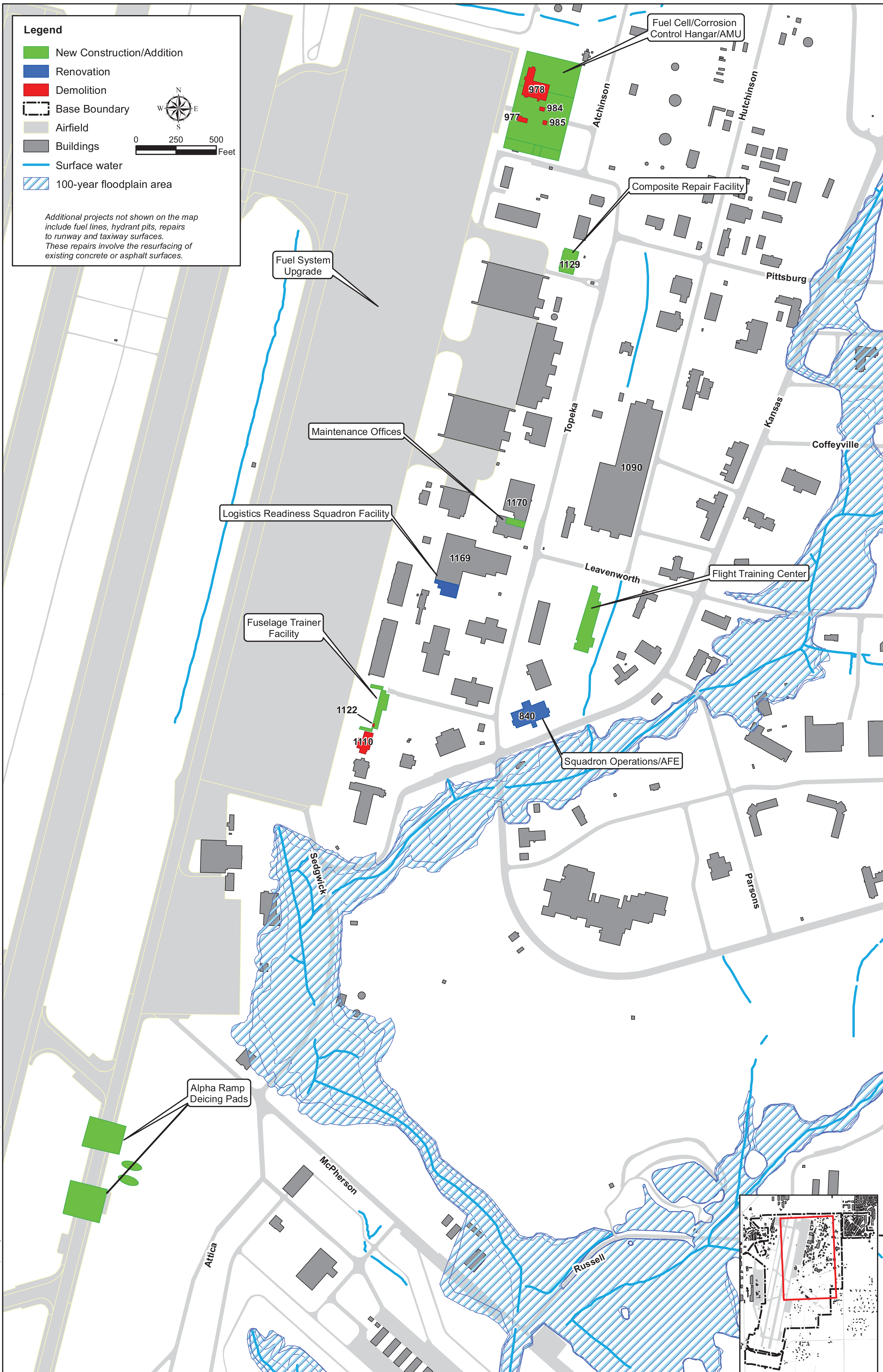


Figure 2-16. Facilities and Infrastructure Projects for the KC-46A FTU Scenario at McConnell AFB

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Table 2-16. McConnell AFB KC-46A FTU Scenario Personnel and Dependent Changes

Personnel	Baseline[a]	KC-46A FTU Scenario	Total
Military (full-time)	3,408	141	3,549
Military Dependents and Family Members	3,220	229[c]	3,449
Part-Time Reservist	460	20	480
Students	0	200	200
DoD Civilian	427	315	742
Other Base Personnel	523	23	546
Total	**8,038[b]**	**928**	**8,966**

[a] Source of baseline information: McConnell AFB 2012.
[b] Baseline does not include personnel numbers from the ANG 184 IW.
[c] Dependents estimated at 2.5 times 65 percent of full-time military personnel only.

2.4.4.2.3 Flight Operations

Table 2-17 provides a comparison of the number of annual airfield operations anticipated with the beddown of the KC-46A FTU mission at McConnell AFB to the existing baseline mission. The table shows that the total annual operations at McConnell AFB would increase from 38,618 per year to 79,982, resulting in an approximate 107 percent increase in annual aircraft operations.

Table 2-17. McConnell AFB Baseline and Projected Annual FTU Scenario End-State Airfield Operations[a]

Aircraft	Unit Flying Days/Year	Baseline						Projected					
		Landings and Takeoffs		Closed Pattern[b]		Total		Landings and Takeoffs		Closed Pattern[b]		Total	
		Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual
KC-135	260	21.31	5,541	73.00	18,980	94.31	24,521	21.31	5,541	73.00	18,980	94.31	24,521
Transient[c]	260	21.83	5,676	21.83	5,676	43.66	11,352	21.83	5,676	21.83	5,676	43.66	11,352
Civilian[d]	365	7.52	2,745	0	0	7.52	2,745	7.52	2,745	0	0	7.52	2,745
KC-46A[e]	240	0	0	0	0	0	0	15.22	3,653	157.13	37,711	172.35	41,364
Total		**50.66**	**13,962**	**94.83**	**24,656**	**145.49**	**38,618**	**65.88**	**17,615**	**251.96**	**62,367**	**317.84**	**79,982**

[a] An operation is the accomplishment of a single maneuver such as a takeoff/departure, an arrival/landing, or half of a closed pattern.
[b] A closed pattern consists of two operations: one takeoff and one landing. The numbers presented are operations.
[c] The primary transient military aircraft types using McConnell AFB include KC-135, F-16, T-1, and T-38 (HQ AMC 2012).
[d] Because the Boeing Corporation and Cessna Corporation manufacturing facilities are adjacent to McConnell AFB, Boeing and Cessna aircraft compose the civilian aircraft that use McConnell AFB. The primary transient civilian aircraft types are Boeing 747 and 767 and Cessna 441.
[e] Approximately 20 percent of the total KC-46A operations would occur during environmental night (10:00 P.M. to 7:00 A.M.).

2.4.4.2.4 Auxiliary Airfields

A variation to the typical training sortie described above could involve performing closed patterns at an auxiliary airfield. As part of the FTU mission at McConnell AFB, KC-46A aircraft would use CSM, Forbes Field (FOE), and Wichita Mid-Continent Airport (ICT) airfields, all three of which are currently being used by KC-135 aircrews. The KC-46A aircraft would use the same AR tracks and fuel jettison areas used by the existing KC-135 mission. KC-46A aircrews associated with the FTU would fly a combined estimate of 6,516 annual aircraft operations at the auxiliary airfields. The location of these airfields relative to McConnell AFB is shown on Figure 2-17. Details regarding the auxiliary airfields are described as follows.

Clinton-Sherman Industrial Airpark (CSM). CSM is proposed to be used as an auxiliary airfield for the FTU proposed for Altus AFB and is described in Section 2.4.1.2.4

Path: H:\KC-46a\Bases\McConnell\GIS\Projects\Figure 2-17 Location of Auxiliary Airfields for McConnell AFB Kansas [used ID_2_17].mxd

Figure 2-17. Location of Auxiliary Airfields for the KC-46A FTU Scenario at McConnell AFB, Kansas

Forbes Field (FOE). FOE is the former Forbes AFB and is currently a joint-use civil-military airport operated by the Metropolitan Topeka Airport Authority. FOE encompasses approximately 2,854 acres and is located approximately six miles south of Topeka, in Shawnee County, Kansas. It is both an active municipal airport and a KANG base. FOE has two concrete runways: 13/31, measuring 12,802 feet, and 3/21, measuring 7,000 feet. There are currently 24,742 annual operations at FOE. Of this total, approximately 70 percent are military aircraft operations (primarily based KC-135 and H-60 aircraft).

Wichita Mid-Continent Airport (ICT). ICT is a commercial airport located in southwest Wichita, in Sedgwick County, Kansas, and is operated by the Wichita Airport Authority. ICT is located approximately 7 miles from downtown Wichita. ICT encompasses approximately 3,248 acres and is the busiest airport in the state of Kansas. ICT contains three concrete runways, the longest of which (1L/19R) is 10,301 feet. Runway 1R/19L is 7,301 feet, and Runway 14/32 is 6,301 feet long. In total, 165,035 aircraft operations are flown per year at ICT. About half of these operations are general aviation, with the remainder being made up in approximately equal parts of transient military and air carrier/taxi operations.

2.4.4.3 MOB 1 Beddown Specifics

This section details the actions necessary at McConnell AFB if selected for the basing of a KC-46A MOB 1 mission. Implementation of the MOB 1 scenario would replace the existing 44 KC-135 aircraft with 36 PAA KC-46A aircraft. The USAF determined that McConnell AFB’s infrastructure and base resources could accommodate the basic requirements for a KC-46A MOB 1 mission within the constraints set by the alternative narrowing process described in Section 2.2.

2.4.4.3.1 Facilities and Infrastructure

The overall facility requirements for the MOB 1 beddown are described in Section 2.3.2. The projects anticipated to be required to support the KC-46A MOB 1 mission at McConnell AFB are listed in Table 2-18. Although some of these requirements are met through existing infrastructure and facilities on McConnell AFB, substantial new construction, renovation, and demolition would be required. However, some demolition/construction and modification/additions to existing facilities and infrastructure would be required at McConnell AFB to support the KC-46A MOB 1 mission. New facilities for the FuT, mobility bag storage, and maintenance training would need to be constructed. A series of additions/alterations and renovations to existing facilities would also be needed to accommodate the KC-46A MOB 1 scenario. The proposed redevelopment would take place within the previously disturbed cantonment area of the base (see Figure 2-18).

Existing flight operations and maintenance (O&M), refueling activities, and other functions associated with the KC-135 mission would need to continue during demolition and reconstruction activities. Certain existing KC-135 functions located in Building 1106 would be temporarily relocated to Buildings 1176, 1171, and 1166. The majority of this renovation would occur inside these existing buildings and would involve moving maintenance and testing equipment, completing utility connections, internally routing data and voice communications lines for temporary office space, and installing a mezzanine storage and shelving system from Building 1108 into Building 1107. The only external portion of this work would involve locating an external heating, ventilation and air conditioning (HVAC) unit within the five foot line of Building 1176. A construction transition plan would also be implemented to ensure all KC-46A construction activities and relocation of KC-135 functions to other facilities would be phased so the KC-135 mission is not adversely impacted as the KC-46A mission is phased in. Taxiway demolition and construction would be phased to not interfere with existing airfield operations.

During demolition and construction of the new hydrant systems, additional refueling vehicles would be used to maintain the KC-135 missions.

Table 2-18. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at McConnell AFB

Project	Project Size (Square Feet)
Demolition	
Building 973[a]	352
Building 977[a]	1,891
Building 978[a]	25,388
Building 984[a]	655
Building 985[a]	400
Building 1101[a]	273
Building 1102[a]	6,500
Building 1106[a]	101,690
Building 1110[b]	7,144
Building 1122[b]	168
Total Square Feet	**144,461**
Renovation	
Building 1108, Air Transportable Galley/Latrine/Seat Pallet Facility	7,216
Building 1094, 2/3 WSTs and 2 BOT	14,659
Building 1129, Composite Shop	8,500
Building 840, (Squad Ops)/AFE	1,798
Building 1183, (Squad Ops)/AFE	1,798
Building 1185, (Squad Ops)	1,798
Building 1186, (Squad Ops)/AFE	1,798
Building 850, AFRC Wing Headquarters	No change
Building 1218, Operations Group Headquarters	27,749
Building 1107, AME Storage and Maintenance	No change[c]
Building 1166, Interior Modifications for Data and Voice Communications	No change
Building 1171, Move Aircraft Electrical and Environmental Systems Testing Equipment from Building 1106	No change
Building 1176, Move Hydraulic Test Stand from Building 1106	No change
Taxiway D Repair[d]	125,676
Parking Ramp Apron Type III Fuel Hydrant System Upgrade	N/A
Apron Fill-In	13,200
Roads and Parking Upgrades	N/A
Total Square Feet	**178,648**
Additions/Alterations	
Building 1092, 1 WST	4,025
Building 1220, Mobility Bag Storage Addition	8,000
Building 852, Maintenance Training Facility	24,375
Apron Fuels Hydrant Upgrade	23 hydrants
Alpha Ramp Deicing Pad Expansions and Supporting Infrastructure	49,900
Total Square Feet	**85,400**
New Construction	
Corrosion Control, Fuel Cell and Maintenance Hangar (2-bay)	214,425
General Maintenance Hangar (3-bay) + (1-bay); Maintenance Shops, E/E Shop	174,297
FuT Facility	10,600
Dormitory	19,174
Total Square Feet	**418,496**

[a] Demolish building to construct new KC-46A hangars.
[b] Demolish building to construct new KC-46A FuT Facility. Demolition analyzed under previous Categorical Exclusion.
[c] Renovations to Building 1107 include installation of a telephone system, fiber optic drops, and mezzanine storage and shelving system.
[d] Taxiway F also requires repairs; however, this project was addressed in the 2012 Installation Development Environmental Assessment.

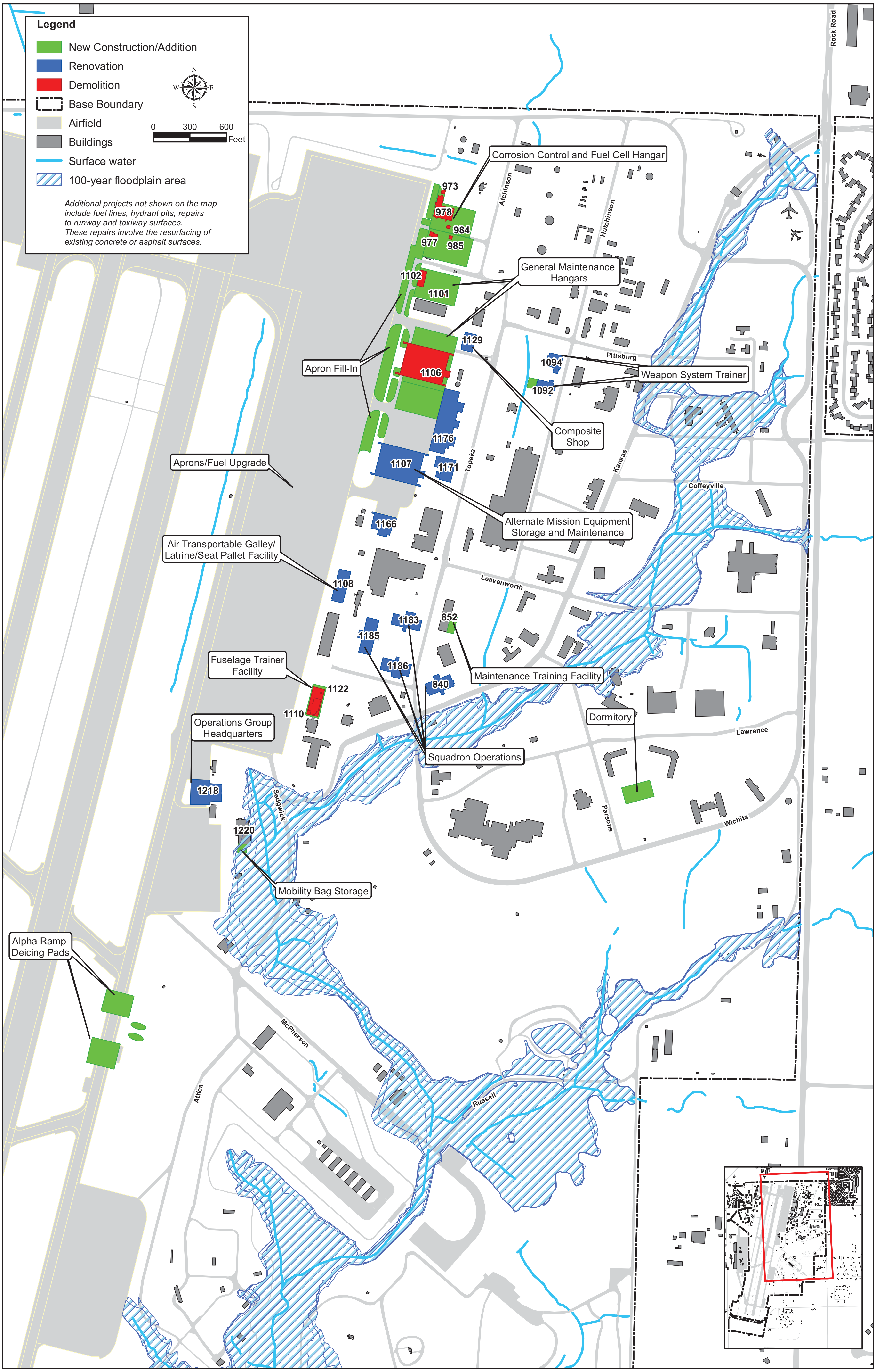

Figure 2-18. Facilities and Infrastructure Projects for the KC-46A MOB 1 Scenario at McConnell AFB

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2.4.4.3.2 Personnel

The current personnel at McConnell AFB and the projected personnel necessary to support the KC-46A MOB 1 mission are provided in Table 2-19. Not counting personnel from the ANG 184 IW, the base has about 4,800 personnel, including military, part-time reserve, government civilians, and contractors. The ANG would have an association with the active-duty component.

Table 2-19. McConnell AFB MOB 1 Scenario Personnel and Dependent Changes

Personnel	Baseline[a]	KC-46A MOB 1 Scenario	KC-135 Drawdown	Change	Total
Military (full-time)	3,408	1,809	-1,920	-111	3,297
Military Dependents and Family Members	3,220	2,940[c]	-3,120[c]	-180	3,040
Part-Time Reservists	460	1,053	-626	427	887
DoD Civilian	427	52	-38	14	441
Other Base Personnel	523	20	0	20	543
Total[a]	**8,038[b]**	**5,874**	**-5,704**	**170**	**8,208**

[a] Source of baseline information: 2012 McConnell AFB Economic Impact Analysis (McConnell AFB 2012c).
[b] Baseline does not include personnel numbers from the ANG 184 IW.
[c] KC-46A and drawdown KC-135 dependents estimated at 2.5 times 65 percent of full-time military personnel only.

The KC-46A MOB 1 mission at McConnell AFB would eventually replace the existing KC-135 mission. The KC-46A MOB 1 mission would require approximately 1,809 full-time military (includes 1,345 active-duty, 451 reserve [air reserve technicians] and 13 BOS) personnel, approximately 1,053 part-time reserve personnel, approximately 52 DoD civilian personnel, and approximately 20 contractors (categorized as “other base personnel”).

About 3,220 military dependents, currently associated with the full-time military personnel at McConnell AFB, live in communities surrounding McConnell AFB. The projected new military personnel are expected to be accompanied by 2,940 dependents.

2.4.4.3.3 Flight Operations

Table 2-20 provides a comparison of the number of annual airfield operations anticipated with the beddown of the KC-46A MOB 1 mission at McConnell AFB to the existing baseline mission. The table shows that the total annual operations would increase from 38,618 per year to 47,807, resulting in an approximate 24 percent increase in annual aircraft operations.

2.4.4.3.4 Auxiliary Airfields

The proposed MOB 1 mission at McConnell AFB would not require the use of auxiliary airfields. The KC-46A aircraft would utilize the existing KC-135 flight tracks, fuel jettison areas, and AR tracks.

Table 2-20. McConnell AFB Baseline and Projected Annual MOB 1 Scenario End-State Airfield Operations[a]

Aircraft	Unit Flying Days/Year	Baseline						Projected					
		Landings and Takeoffs		Closed Pattern[b]		Total		Landings and Takeoffs		Closed Pattern[b]		Total	
		Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual[f]	Avg. Busy Day	Annual	Avg. Busy Day	Annual	Avg. Busy Day	Annual[f]
KC-135	260	21.31	5,541	73.00	18,980	94.31	24,521	0	0	0	0	0	0
Transient[c]	260	21.83	5,676	21.83	5,676	43.66	11,352	21.83	5,676	21.83	5,676	43.66	11,352
Civilian[d]	365	7.52	2,745	0	0	7.52	2,745	7.52	2,745	0	0	7.52	2,745
KC-46A[e]	312[f]	0	0	0	0	0	0	17.60	5,630	90.00	28,080	107.60	33,710
Total[g]		**50.66**	**13,962**	**94.83**	**24,656**	**145.49**	**38,618**	**46.95**	**14,051**	**111.83**	**33,756**	**158.78**	**47,807**

[a] An operation is the accomplishment of a single maneuver such as a takeoff/departure, an arrival/landing, or half of a closed pattern.
[b] A closed pattern consists of two operations: one takeoff and one landing. The numbers presented are operations.
[c] The primary transient military aircraft types using McConnell AFB include KC-135, F-16, T-1, and T-38 (HQ AMC 2012).
[d] Because the Boeing Corporation and Cessna Corporation manufacturing facilities are adjacent to McConnell AFB, Boeing and Cessna aircraft compose the civilian aircraft that use McConnell AFB. The primary transient civilian aircraft types are Boeing 747 and 767 and Cessna 441.
[e] Approximately 10 percent of the total KC-46A operations would occur during environmental night (10:00 P.M. to 7:00 A.M.).
[f] The annual total represents a combination of operations resulting from local training sorties, which occur 312 days per year, and mission sorties, which occur 365 days per year. The expected 475 mission sorties per year would not normally conduct closed pattern operations, whereas training sorties would conduct an average of approximately six closed patterns per sortie.
[g] The total operations in this table are a combination of all aircraft operations and are based on different numbers of flying days.

2.5 NO ACTION ALTERNATIVE

Section 1502.14(d) of the National Environmental Policy Act (NEPA) requires the analysis of a No Action Alternative. Analysis of a No Action Alternative provides a benchmark, enabling decision makers to compare the magnitude of the environmental effects to the proposed action or alternatives. No action means that an action would not take place, and the resulting environmental effects from taking no action would be compared with the effects of allowing the proposed activity to go forward.

No action for this Final EIS reflects the *status quo*, where the KC-46A beddown would not occur at any base at this time. No KC-46A aircraft would arrive, and all existing aircraft would remain in place. No construction, renovation, or demolition of any structure or other infrastructure would occur. No KC-46A personnel changes or construction would occur, and no changes to existing flight operations would occur.

The No Action Alternative has been carried forward in the EIS per CEQ regulations and as a baseline of existing impact continued into the future against which to compare impacts of the action alternatives.

Evaluation of the No Action Alternative compares the effects of implementing the KC-46A FTU and MOB 1 scenarios with the effects of the No Action Alternative at each base and for each resource area.

At each base, there are ongoing and currently planned activities and programs that would continue, whether or not the basing of KC-46A would be implemented. These activities have been approved by the USAF and supported by existing NEPA documentation. The No Action Alternative is described for each resource area in Section 4.5

2.6 PREFERRED ALTERNATIVE

The USAF identified Altus AFB as the Preferred Alternative for the FTU scenario and McConnell AFB as the Preferred Alternative for the MOB 1 scenario. Fairchild and Grand Forks AFBs were identified as reasonable alternatives for the MOB 1 scenario. The USAF selected the FTU and MOB 1 Preferred Alternatives using operational analysis, the results of site surveys, and military judgment factors.

2.7 COMPARISON OF ENVIRONMENTAL CONSEQUENCES

Table 2-21 summarizes the potential environmental consequences from Chapter 4 where the FTU and MOB 1 mission requirements from Chapter 2 are overlaid on the baseline conditions from Chapter 3. The consequences are presented for each environmental resource area and are described for each Final EIS alternative.

This summary comparison of environmental consequences provides an overview of the consequences associated with implementation of the FTU and MOB 1 missions at each base. The following NEPA activities have been completed to ensure that decision makers have a comprehensive understanding of the potential environmental consequences of their decision.

- Scoping. Four public scoping meetings were conducted over a 2-week period, with public and agency input identifying important environmental resources.
- Documentation of existing environmental conditions for each alternative base. The existing conditions for these resources relied heavily on recent environmental materials and Federal and state databases prepared at and near each base.
- Base-specific assessments of environmental consequences of the beddown of the KC-46A missions. Each assessment overlaid the project details upon the existing conditions to estimate potential base-specific environmental consequences.
- Public Hearings. Four public hearings were conducted over a 2-week period, with public and agency input on the Draft EIS.

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Table 2-21. Comparative Summary of Environmental Consequences

Resource Area	Altus AFB		Fairchild AFB	Grand Forks AFB	McConnell AFB		No Action
	FTU	MOB 1	MOB 1	MOB 1	FTU	MOB 1	
Noise	Affected by 65 dB DNL or greater: Off-base Acres: +584 Estimated off-base residents: +17 Auxiliary airfield operations would occur in the context of busy airfields. The relatively small number of proposed KC-46A operations would not result in any meaningful increases in time-averaged noise levels.	Affected by 65 dB DNL or greater: Off-base Acres: +155 Estimated off-base residents: +6	Affected by 65 dB DNL or greater: Off-base Acres: +53 Estimated off-base residents: +2	Affected by 65 dB DNL or greater: Off-base Acres: +62 Estimated off-base residents: 0	Affected by 65 dB DNL or greater: Off-base Acres: +273 Estimated off-base residents: +594 Auxiliary airfield operations would occur in the context of busy airfields. The relatively small number of proposed KC-46A operations would not result in any meaningful increases in time-averaged noise levels.	Affected by 65 dB DNL or greater: Off-base Acres: -386 Estimated off-base residents: -199 Net reduction in time-averaged noise levels would result from replacement of the KC-135 mission.	Under the No Action Alternative, baseline conditions at each base would remain as is. No changes would occur to the noise levels surrounding each base, noise contours would remain as they are today, and no construction related noise would result from the implementation of this alternative. Impacts under the No Action Alternative would be negligible.
Air Quality	Emissions from KC-46A FTU operations would not exceed Prevention of Significant Deterioration (PSD) thresholds for volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxide (SO_x), particulate matter less than or equal to 10 microns in diameter (PM_{10}), or PM less than or equal to 2.5 microns in diameter ($PM_{2.5}$). Although nitrogen oxide (NO_x) emissions from KC-46A FTU operations would exceed 250 tons per year, national ambient air quality standards (NAAQS) would likely not be exceeded. Emissions from KC-46A operations under the FTU scenario at any auxiliary airfield would not exceed an applicable conformity or PSD threshold.	Emissions from KC-46A MOB 1 operations would not exceed PSD thresholds for VOCs, SO_x, PM_{10}, or $PM_{2.5}$. Although CO and NO_x emissions from KC-46A MOB 1 operations would exceed 250 tons per year, NAAQS would likely not be exceeded.	Emissions from KC-46A operations would not exceed PSD thresholds for VOCs, CO, SO_x, PM_{10}, or $PM_{2.5}$. NO_x emissions from KC-46A operations would exceed the 250-tons-per-year PSD threshold. These NO_x emission increases would amount to about 4 percent of the total NO_x emissions generated by Spokane County in 2008, and they could be substantial enough to contribute to an exceedance of the ozone (O_3) NAAQS in the region. The net changes in emissions generated within the Spokane CO and PM_{10} maintenance areas would not exceed the applicable conformity thresholds of 100 tons per year for CO or PM_{10}. Therefore, the MOB 1 scenario at Fairchild AFB would produce less than significant CO and PM_{10} impacts within these areas.	Emissions from KC-46A operations would not exceed PSD thresholds for VOCs, SO_x, PM_{10}, or $PM_{2.5}$. Although CO and NO_x emissions from KC-46A operations would exceed 250 tons per year, AAQS would likely not be exceeded.	Emissions from KC-46A FTU operations would not exceed any PSD pollutant thresholds for VOCs, CO, SO_x, PM_{10}, or $PM_{2.5}$. Although NO_x emission increases from KC-46A FTU operations would exceed the PSD threshold of 250 tons per year, they would likely not have the potential to contribute to an exceedance of the NO_2 NAAQS. NOx emissions generated by operation of the FTU scenario would occur in an area that is in jeopardy of not continuing to attain the NAAQS for O_3. Therefore, the increase in NO_x (and VOC) emissions resulting from operation of the FTU scenario, in combination with existing emissions, could be substantial enough to contribute to an exceedance of the O_3 NAAQS in the region. Emissions from KC-46A operations under the FTU scenario at any auxiliary airfield would not exceed an applicable PSD threshold.	Emissions from KC-46A operations would not exceed 250 tons per year for VOCs, CO, SO_x, PM_{10}, or $PM_{2.5}$. The NO_x emission increases from operation of the MOB 1 scenario would be less than those estimated for the proposed FTU scenario at McConnell AFB. Therefore, similar to the FTU scenario, they would likely not have the potential to contribute to an exceedance of the NO_2 NAAQS. However, the increase in NO_x (and VOC) emissions resulting from operation of the MOB 1 scenario, in combination with existing emissions, could be substantial enough to contribute to an exceedance of the O_3 NAAQS in the region.	Under the No Action Alternative, baseline conditions at each base would remain as is. No construction emissions would occur and operational emissions would be identical to the current baseline conditions. Impacts under the No Action Alternative would be negligible.
	Emissions from construction activities would be below any PSD pollutant threshold of 250 tons per year.						

Table 2-21. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Altus AFB		Fairchild AFB	Grand Forks AFB	McConnell AFB		No Action
	FTU	MOB 1	MOB 1	MOB 1	FTU	MOB 1	
Safety	The basing of KC-46A aircraft under either the FTU or MOB 1 scenario is not anticipated to increase the risk of aircraft accidents due to wildlife strikes. Ongoing elements of the respective base-specific bird/wildlife aircraft strike hazard (BASH) plans would continue. Special briefings and modifications to the BASH plans addressing KC-46A operations and the potential for wildlife strikes would be provided to pilots whenever the potential exists for greater bird strikes within the airspace. KC-46A pilots would be subject to these procedures. Therefore, no significant impact would occur related to bird/wildlife-aircraft strike hazard issues. No unique construction practices or materials would be required as part of any of the renovation, addition, or construction projects associated with the KC-46A beddown scenarios. All renovation and construction activities would comply with all applicable U.S. Occupational Safety and Health Administration (OSHA) regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements. The USAF does not anticipate any significant safety impacts as a result of construction, demolition, or renovation if all applicable Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) and OSHA requirements are implemented. Proposed construction, renovation, and infrastructure-improvement projects related to the KC-46A aircraft scenarios would be consistent with established APZs at each base.						Under the No Action Alternative, baseline conditions at each of base would remain as is. No additional impacts would occur to flight or ground safety.
Soil and Water Resources	The total disturbed area would be less than five acres.	The total disturbed area would be less than 80 acres.	The total disturbed area would be less than 40 acres.	The total disturbed area would be less than 35 acres.	The total disturbed area would be less than 7 acres.	The total disturbed area would be less than 12 acres. The addition to Building 1220 would impact a floodplain. A Finding of No Practicable Alternative (FONPA) would be prepared should this alternative be selected.	Under the No Action Alternative, baseline conditions at each base would remain as is. None of the KC-46A proposed construction would occur and there would be no additional impacts to soil and water resources.
	Relevant stormwater and land disturbance permits would be required and stormwater plans would be updated. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales, and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures.						
Biological Resources	No significant impacts on biological resources or wetlands are anticipated to result from implementation of the KC-46A scenarios.			Approximately 2 acres of potentially jurisdictional wetlands would be impacted. Section 404 and 401 permits and mitigation would be required should this alternative be selected.	No significant impacts on biological resources or wetlands are anticipated to result from implementation of the KC-46A scenarios.		Under the No Action Alternative, baseline conditions at each base would remain as is. No vegetation or wildlife habitat would be disturbed. No additional impacts to biological resources would be anticipated.

Table 2-21. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Altus AFB		Fairchild AFB	Grand Forks AFB	McConnell AFB		No Action
	FTU	MOB 1	MOB 1	MOB 1	FTU	MOB 1	
Cultural Resources	No adverse effect on one historic property. Oklahoma State Historic Preservation Office (SHPO) has concurred with the USAF's determination that modifications proposed for Building 285 as part of the KC-46A undertaking will not adversely affect the building's National Register of Historic Places (NRHP) eligibility (letter from SHPO to USAF dated 29 July 2013), concluding the Section 106 consultation process. No adverse Section 106 impacts to tribal resources are anticipated. Consultation with 10 tribes resulted in no disagreement with the USAF finding of no adverse impact. Section 106 consultation for the KC-46A FTU and MOB 1 beddown proposed alternatives at Altus AFB is now complete.		Adverse impact to Building 2050 (hangar) and a potential adverse impact to Building 2245 (letter from SHPO to USAF dated 25 June 2013). National Historic Preservation Act (NHPA) Section 106 consultation with the Washington Department of Archaeology and Historic Preservation (DAHP) concluded with an amendment to an existing Memorandum of Agreement (MOA) to address the possibility of adverse effects to Building 2050 (hangar) and Building 2245. No adverse Section 106 impacts are anticipated to tribal resources. Consultation with four tribes resulted in no disagreement with the USAF finding of no adverse impact. Section 106 consultation for the KC-46A MOB 1 beddown proposed alternative at Fairchild AFB is now complete.	NHPA Section 106 SHPO consultation has been completed and includes no impacts on architectural resources. The North Dakota SHPO has concurred with the USAF's finding that no historic properties would be affected (letter from SHPO to USAF dated 8 July 2013). No adverse Section 106 impacts to tribal resources are anticipated. The USAF consulted with 23 tribes and one tribe expressed concerns regarding the potential for impacts. Following further consultation with the one tribe, the USAF concluded consultation with a finding of no adverse impact. Section 106 consultation for the KC-46A MOB 1 beddown proposed alternative at Grand Forks AFB is now complete.	No adverse effects are anticipated on architectural resources or other historic properties. The Kansas SHPO has concurred with the USAF's finding (letter from SHPO to USAF dated 18 June 2013). No adverse Section 106 impacts to tribal resources are anticipated. Consultation with 12 tribes resulted in no disagreement with the USAF finding of no adverse impact. Section 106 consultation for the KC-46A FTU beddown proposed alternative at McConnell AFB is now complete.	Adverse effect on NRHP-eligible Building 1106; no adverse effect on historic properties for modifications to Buildings 1107 and 1218 (letter from SHPO to USAF dated 26 August 2013). McConnell AFB and the Kansas SHPO have signed a MOA agreeing to measures that mitigate the adverse effect on historic properties that would result from the selection of McConnell AFB for the MOB 1 scenario. No adverse Section 106 impacts to tribal resources are anticipated. Consultation with 12 tribes resulted in no disagreement with the USAF finding of no adverse impact. Section 106 consultation for the KC-46A MOB 1 beddown proposed alternative at McConnell AFB is now complete.	Under the No Action Alternative, baseline conditions at each base would remain as is. No additional impacts to historical buildings or other cultural resources would occur.
	Impacts on archaeological resources are not expected. All project areas have been surveyed. Inadvertent discovery of previously unrecorded cultural resources would be managed in compliance with Federal and state laws and USAF regulations. Impacts on traditional cultural resources are unlikely; consultation with tribes resulted in no disagreement with the finding that there are no known tribal traditional cultural properties or traditional cultural resources at any base. Refer to Volume II, Appendix A, Section A.3, for consultation detail.						
Land Use	All new construction would occur in the appropriate base land use areas with no incompatible development planned. No impacts on land use on base from construction projects or noise from air operations are anticipated.						Under the No Action Alternative, baseline conditions at each base would remain as is. No changes would occur to planning noise contours surrounding the bases and no land use changes would occur within the base boundaries.
	Implementation of the FTU scenario would increase the off-base area affected by noise levels of 65 dB DNL or greater by 580 acres, which is mostly agricultural land and existing low-density residential land. There would be no significant effects on land use at any of the four auxiliary airfields as a result of the slight increase in aircraft operations noise.	Implementation of the MOB 1 scenario would increase the off-base area affected by noise levels of 65 dB DNL or greater by 155 acres, which is mostly agricultural land and existing low-density residential land. No significant effects are anticipated on land use resources.	Implementation of the MOB 1 scenario would increase the off-base area affected by noise levels of 65 dB DNL or greater by 53 acres, while there would be a reduction of the affected area on base. The off-base area is primarily vacant and no residential areas would be affected. There would be a minor impact from the increased number of aircraft operations because of existing incompatible residential land use within the northern APZ II.	Implementation of the MOB 1 scenario would increase the on- and off-base areas affected by noise levels of 65 dB DNL or greater by 62 acres. Surrounding areas are agricultural and low-density residential and were previously exposed to KC-135 aircraft operations from Grand Forks AFB.	Because the FTU scenario is additive to the existing KC-135 mission, an additional 273 acres off base and 594 people would be exposed to noise levels of 65 dB DNL or greater. The affected area includes mixed-density residential areas in Eastridge to the north and some homes in residentially zoned land to the southwest of the airfield. There would be an adverse impact on existing incompatible residential, commercial, and industrial land in the CZs and APZs from the increased number of operations at the airfield. Recommend continued coordination with local jurisdictions to provide more compatible land use zoning surrounding the airfield.	Implementation of the MOB 1 scenario would result in a net benefit to surrounding land (-386 acres) and people (-199) due to the net decrease in acres and estimated residents exposed to noise levels of 65 dB DNL or greater.	

Table 2-21. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Altus AFB		Fairchild AFB	Grand Forks AFB	McConnell AFB		No Action
	FTU	MOB 1	MOB 1	MOB 1	FTU	MOB 1	
Infrastructure	Implementation of the FTU scenario would increase the average daily demand for potable water from 30 to 37 percent of base system capacity and peak demand from 51 to 59 percent. Daily discharge to the wastewater system would increase from 4 to 6 percent of base system capacity and peak discharge would increase from 6 to 8 percent. Daily demand for electricity would increase from 12 to 16 percent of base system capacity and peak demand would increase from 15 to 18 percent. Daily demand for natural gas would increase from 9 to 14 percent of base system capacity and peak demand would increase from 23 to 28 percent. Implementation of the FTU scenario would disturb less than 5 acres of land. Construction activities would be conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. Implementation of the FTU scenario would result in approximately 1,937 tons of C&D debris to be recycled or reused and approximately 1,292 tons to be transported to the City of Altus Landfill or other landfills in the region. Regarding on-base transportation systems, on-base mission personnel vehicle trips would potentially increase by 12 percent and no level-of-service impacts are anticipated.	Implementation of the MOB 1 scenario would increase the average daily demand for potable water from 30 to 82 percent of base system capacity and peak demand from 51 to 103 percent of contracted amount. Daily discharge to the wastewater system would increase from 4 to 19 percent of base system capacity and peak discharge would increase from 6 to 21 percent. Daily demand for electricity would increase from 12 to 35 percent of base system capacity and peak demand would increase from 15 to 37 percent. Daily demand for natural gas would increase from 9 to 43 percent of base system capacity and peak demand would increase from 23 to 57 percent. Implementation of the MOB 1 scenario would disturb less than 80 acres of land. Construction activities would be conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. Implementation of the MOB 1 scenario would result in approximately 29,417 tons of C&D debris to be recycled or reused and approximately 19,611 tons to be transported to the City of Altus Landfill or other landfills in the region. Regarding on-base transportation systems, on-base mission personnel vehicle trips would increase by 54 percent and no level-of-service impacts are anticipated. However, this would increase congestion and queuing at the Main Gate and Commercial Gate during peak morning and evening traffic.	Implementation of the MOB 1 scenario would increase the average daily demand for potable water from 16 to 18 percent of base system capacity and peak demand from 44 to 46 percent. Daily discharge to the wastewater system would increase from 39 to 45 percent of base system capacity and peak discharge would increase from 70 to 77 percent. Increases in electrical use and natural gas associated with new facilities and increases in personnel and dependents are anticipated to be less than 1 percent of state-wide residential electrical/natural gas usage. Implementation of the MOB 1 scenario would disturb less than 40 acres of land. Construction activities would be conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. Implementation of the MOB 1 scenario would result in approximately 13,763 tons of C&D debris to be recycled or reused and approximately 9,175 tons to be transported to landfills in the region. On-base mission personnel vehicle trips would increase by 7.5 percent. No level-of-service impacts are anticipated. This could increase congestion and queuing at the Main Gate and Thorpe/Rambo Gate during peak morning and evening traffic.	Implementation of the MOB 1 scenario would increase the average daily demand for potable water from 16 to 41 percent of base system capacity. Daily discharge to the wastewater system would increase from 42 to 94 percent of base system capacity. Daily demand for electricity would increase from 17 to 43 percent of base system capacity. Daily demand for natural gas would increase from 11 to 31 percent of base system capacity. Implementation of the MOB 1 scenario would disturb less than 35 acres of land. Construction activities would be conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. Implementation of the MOB 1 scenario would result in approximately 28,738 tons of C&D debris to be recycled or reused and approximately 19,159 tons to be transported to landfills in the region. On-base mission personnel vehicle trips would increase by approximately 70 percent. No level-of-service impacts are anticipated. However, this would increase congestion and queuing at the Main Gate and Commercial Gate during peak morning and evening traffic.	Implementation of the FTU scenario would increase the average daily demand for potable water from 10 to 15 percent of base system capacity and peak demand from 14 to 19 percent. Daily discharge to the wastewater system would increase from 7 to 9 percent of base system capacity and peak discharge would increase from 27 to 29 percent. Daily demand for electricity would increase from 47 to 56 percent of base system capacity and peak demand would increase from 60 to 69 percent. Daily demand for natural gas would increase from 16 to 23 percent of base system capacity and peak demand would increase from 36 to 43 percent. Implementation of the FTU scenario would disturb less than 7 acres of land. Construction activities would be conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. Implementation of the FTU scenario would result in approximately 2,281 tons of C&D debris to be recycled or reused and approximately 1,521 tons to be placed in the Brooks or Construction, Demolition & Recycle (CDR) Landfill or a combination of both. On-base mission personnel vehicle trips would increase by 10 percent. No level-of-service impacts are anticipated.	Implementation of the MOB 1 scenario would increase the average daily demand for potable water from 10 to 11 percent of base system capacity and peak demand from 14 to 15 percent. The peak discharge to the wastewater system would increase from 27 to 28 percent of base system capacity, but average daily discharge would remain unchanged at 7 percent. Daily demand for electricity would increase from 47 to 48 percent of base system capacity and peak demand would increase from 60 to 61 percent. Daily demand for natural gas would increase from 16 to 17 percent of base system capacity and peak demand would increase from 36 to 38 percent. Implementation of the MOB 1 scenario would disturb less than 12 acres of land. Construction activities would be conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. Implementation of the MOB 1 scenario would result in approximately 7,736 tons of C&D debris to be recycled or reused and approximately 5,158 tons to be placed in the Brooks or CDR Landfill or a combination of both. On-base mission personnel vehicle trips would decrease by approximately 2 percent. No level-of-service impacts are anticipated.	Under the No Action Alternative, baseline conditions at each base would remain as is. No new construction would occur and no new personnel would arrive or decrease at any of the bases. No additional impacts to the infrastructure system at any of the bases would occur.

Table 2-21. Comparative Summary of Environmental Consequences (Continued)

<table>
<tr><th rowspan="2">Resource Area</th><th colspan="2">Altus AFB</th><th>Fairchild AFB</th><th>Grand Forks AFB</th><th colspan="2">McConnell AFB</th><th rowspan="2">No Action</th></tr>
<tr><th>FTU</th><th>MOB 1</th><th>MOB 1</th><th>MOB 1</th><th>FTU</th><th>MOB 1</th></tr>
<tr><td rowspan="2">Hazardous Materials and Waste</td><td colspan="3">The types of hazardous materials and wastes are consistent with those currently being utilized and generated by the KC-135 mission, but the quantities of hazardous materials used and wastes generated would increase.</td><td>The quantities and types of hazardous materials used and wastes generated would increase relative to the current RPA missions, but would be consistent with those utilized and generated by the previous KC-135 mission.</td><td colspan="2">The types of hazardous materials and wastes are consistent with those currently being utilized and generated by the KC-135 mission, but the quantities of hazardous materials used and wastes generated would increase.</td><td rowspan="2">Under the No Action Alternative, baseline conditions at each base would remain as is. Each base would continue to use hazardous materials and dispose of hazardous waste as described for each base's baseline conditions.</td></tr>
<tr><td colspan="6">The systems engineering process has eliminated halon and minimized the use of the hazardous materials hexavalent chromium and cadmium. Other hazardous materials such as trichloroethane have available alternates and would not be required for the KC-46A. The preference would be to use the least hazardous material when alternatives are available. Any structures proposed for upgrade or retrofit would be inspected for asbestos-containing materials (ACM) and lead-based paint according to established procedures. Modifications and/or additions to existing buildings would occur in proximity to existing Environmental Restoration Program (ERP) sites. Formal construction waivers are not required, but the USAF requires the review of excavation and/or construction siting and compatibility with environmental cleanup sites to be conducted and documented in accordance with current environmental impact analysis processes. During the design phase for each development project, proximity to the various types of ERP sites will be evaluated to determine if additional costs will need to be included in project estimates to maintain the proper land use controls and the groundwater monitoring well networks and to incorporate proper health and safety precautions into construction plans.</td></tr>
<tr><td>Socioeconomics (all numbers are approximated)</td><td>Population
Overall increase in population to Jackson County from incoming military personnel, students, and family members (does not include DoD civilians, part-time Reservists, or contractors): 578 (2.2 percent increase in region of influence [ROI]).
Economic Activity
Total increase on-base full-time military personnel, students, DoD civilians, and contractors: 619 (15.9 percent increase of on-base jobs). Total construction costs of $52 million and O&M costs of $11 million could generate 909 jobs and $4 million in indirect and induced income for the duration of the construction activity.
Housing
Assuming all 144 incoming full-time military personnel would require off-base housing, the housing market in the ROI would be anticipated to support the incoming personnel. Adequate facilities on and off base are available to support the incoming students.
Education
An estimated 140 military dependents of school age would enter any of the six school districts in Jackson County.</td><td>Population
Overall increase in population to Jackson County from incoming military personnel and family members (does not include DoD civilians, part-time Reservists, or contractors): 4,917 (18.6 percent increase in ROI).
Economic Activity
Total increase on-base full-time military personnel, DoD civilians, and contractors: 1,922 (49 percent increase of on-base jobs). Total construction costs of $400 million could generate 5,628 jobs and $24 million in indirect and induced income for the duration of the construction activity.
Housing
The housing market in the ROI and surrounding communities within adjacent counties would be anticipated to support the incoming personnel. An HRMA would be required.
Education
An estimated 1,826 military dependents of school-age would enter any of the six school districts in Jackson County or surrounding communities based upon where incoming military personnel reside.</td><td>Population
Overall increase in population to Spokane County from incoming military personnel and family members associated with the KC-46A MOB 1 scenario and the drawdown of military personnel and family members associated with the KC-135 (does not include DoD civilians, part-time Guardsmen, or contractors): 1,095 (0.2 percent increase in ROI).
Economic Activity
Total increase on-base full-time military personnel, DoD civilians, and contractors: 438 (9.7 percent increase of on-base jobs). Total construction costs of $292 million could generate 3,022 jobs and $65.5 million in indirect and induced income for the duration of the construction activity.
Housing
Assuming all 1,656 incoming full-time military personnel associated with KC-46A would require off-base housing, and all 1,239 outgoing full-time military personnel associated with KC-135 would depart from off-base housing, the housing market in the ROI would be anticipated to support the change in personnel. An HRMA would be required.
Education
An estimated 407 military dependents of school age would be anticipated to enter the Spokane Public School District.</td><td>Population
Overall increase in population to Grand Forks County from incoming military personnel and family members (does not include DoD civilians, part-time Guardsmen, or contractors): 4,526 (6.8 percent increase in ROI).
Economic Activity
Total increase on-base full-time military personnel, DoD civilians, and contractors: 1,747 (69 percent increase of on-base jobs). Total construction costs of $345 million could generate 4,326 jobs and $51 million in indirect and induced income for the duration of the construction activity.
Housing
Assuming all 1,724 incoming full-time military personnel would require off-base housing, the housing market in the ROI would be anticipated to support the incoming personnel. An HRMA would be required.
Education
Approximately 1,681 military and non-military dependents of school age would enter any of the nine public school districts in Grand Forks County.</td><td>Population
Overall increase in population to Sedgwick County from incoming military personnel and family members and students (does not include DoD civilians, part-time Reservists, or contractors): 570 (0.2 percent increase in ROI).
Economic Activity
Total increase on-base full-time military personnel, DoD civilians, students, and contractors: 679 (15.6 percent increase of on-base jobs). Total construction costs of $154 million and O&M costs of $16 million could generate 2,234 jobs and $36 million in indirect and induced income for the duration of the construction activity.
Housing
Assuming all 141 incoming full-time military personnel would require off-base housing, the housing market in the ROI would be anticipated to support the incoming personnel. Adequate facilities on and off base are available to support the incoming students.
Education
Approximately 137 military dependents of school age would enter any of the 10 public school districts in Sedgwick County.</td><td>Population
Overall decrease in population to Sedgwick County from incoming military personnel and family members associated with the KC-46A MOB 1 scenario and the drawdown of military personnel and family members associated with the KC-135 (does not include DoD civilians, part-time Reservists, or contractors): -291 (0.1 percent decrease in ROI).
Economic Activity
Total change of on-base full-time military personnel, DoD civilians and contractors: -77 (1.8 percent decrease of on-base jobs). Total construction costs of $264 million could generate 3,456 jobs and $55 million in indirect and induced income for the duration of the construction activity.
Housing
Assuming all 1,809 incoming full-time military personnel associated with KC-46A would require off-base housing, and all 1,920 outgoing full-time military personnel associated with KC-135 would depart from off-base housing, the housing market in the ROI would be anticipated to support the change in personnel. An HRMA would be required.
Education
Approximately 108 military dependents of school age would no longer attend the county schools.</td><td>Under the No Action Alternative, baseline conditions would remain as is. No new personnel increases or decreases would occur at any of the bases and none of the bases would receive the benefits of a population increase. No construction would occur and therefore no construction related beneficial expenditures would occur.</td></tr>
</table>

Table 2-21. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Altus AFB		Fairchild AFB	Grand Forks AFB	McConnell AFB		No Action
	FTU	MOB 1	MOB 1	MOB 1	FTU	MOB 1	
Socioeconomics (Continued) (all numbers are approximated)	***Public Services*** Demand for public services in Jackson County has increased for several years and would continue to increase with incoming population. ***Base Services*** There are adequate infrastructure and staffing to support incoming military populations.	***Public Services*** Although this scenario would increase the demand for public services, because of the need for additional housing, some of the incoming personnel might reside in surrounding counties where additional public services are available. ***Base Services*** Several Base services would require additional manpower and facilities to accommodate the incoming personnel.	***Public Services*** Public services would be anticipated to support the incoming population. ***Base Services*** Base services have adequate capacity in the CDC, housing, fitness, and dining facilities under the existing infrastructure to support the proposed MOB 1 scenario due to the drawdown of the KC-135 mission.	***Public Services*** The increase in the county population would slightly impact police, fire, or other services and could require additional manpower to support the incoming population. ***Base Services*** There is adequate infrastructure and capacity to support incoming military populations.	***Public Services*** Public services would be anticipated to support the incoming population. ***Base Services*** There are adequate infrastructure and staffing to support incoming military population.	***Public Services*** Public services would be anticipated to support the change in population. ***Base Services*** There are adequate infrastructure and staffing to support incoming military, particularly with the KC-135 drawdown.	
Environmental Justice and the Protection of Children	Implementation of either scenario at any of the bases is not anticipated to disproportionately impact any minority, low-income, or off-base children populations.						Under the No Action Alternative, baseline conditions at each base would remain as is. There would be no environmental justice impacts or impacts to populations of children at any of the bases.

2.8 MITIGATION

Mitigation measures avoid, minimize, remediate, or compensate for environmental impact. CEQ regulations (40 CFR 1508.20) define mitigation to include the following:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action, and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

Avoiding, minimizing, or reducing potential impacts has been a priority guiding the development of the KC-46A scenarios and aircraft operations. Mitigation measures are either built or designed into the proposed action and alternatives; applied to construction, operation, or maintenance involved in the action; or implemented as compensatory measures. Following the EIS Record of Decision (ROD), a Mitigation Plan will be prepared in accordance with 32 CFR 989.22(d). The Mitigation Plan will address specific mitigations identified and agreed to during the Environmental Impact Analysis Process (EIAP).

Given the relative immaturity of the KC-46A program, identification of new data and information relative to the aircraft could arise and it is possible that the impacts identified in the Final EIS may be different from those expected. An understanding of various aspects that are part of a complex interrelated KC-46A operational environment may not be achieved without a more long-term process built around a continuous cycle of evaluation, learning, and improvement over time.

To accommodate this, the Mitigation Plan will identify principal and subordinate organizations having responsibility for oversight and execution of specific mitigation and management actions. The plan will be prepared in accordance with the CEQ mitigation and monitoring guidance.

2.8.1 Measures Proposed to Reduce Potential for Environmental Impacts

Specific mitigation measures are presented in Table 2-22. The table identifies proposed mitigation measures to reduce the potential for environmental impacts. The table presents the mitigation measures by resource area, base, and mission.

Table 2-22. Mitigation Measures to Reduce the Potential for Environmental Impacts

Resource Area/Alternative	Mitigations Measures to Reduce the Potential for Environmental Impacts
Noise	
All Bases	No base-specific mitigation identified.
Air Quality	
All Bases	No base-specific mitigation identified.
Safety	
All Bases	No base-specific mitigation identified.
Soils and Water	
All Bases	No base-specific mitigation identified.
Biological Resources	
Altus AFB FTU	No base-specific mitigation identified.
Altus AFB MOB 1	No base-specific mitigation identified.
Fairchild AFB MOB 1	No base-specific mitigation identified.
Grand Forks AFB MOB 1	Implementation of the MOB 1 scenario at Grand Forks AFB could impact wetlands. Should Grand Forks AFB be selected for the MOB 1 mission, the USAF would work with the U.S. Army Corps of Engineers (USACE) and the North Dakota Department of Health (NDDH) to determine if any of the impacted wetlands are subject to regulation under Sections 401/404 of the Clean Water Act (CWA). If wetlands with a watershed greater than 80 acres are drained or filled, a permit is required from the North Dakota State Engineer. The USAF would work with regulators to determine any permit conditions, including mitigation requirements (as appropriate).
McConnell AFB FTU	No base-specific mitigation identified.
McConnell AFB MOB 1	No base-specific mitigation identified.
Cultural Resources	
Altus AFB FTU	No base-specific mitigation identified.
Altus AFB MOB 1	No base-specific mitigation identified.
Fairchild AFB MOB 1	If Fairchild AFB is selected to host the MOB 1 scenario, mitigation for adverse impacts to cultural resources would be required. The Washington State Historic Preservation Office (SHPO) (Department of Archaeology and Historic Preservation [DAHP]) has concurred that Building 2050, constructed in 1943, is eligible for the National Register of Historic Places (NRHP). Fairchild AFB has amended the existing Section 106 Memorandum of Agreement (MOA) for the demolition of buildings in the Flight Line Historic District. This signed MOA amendment indicates that Fairchild AFB would initiate consultation with the DAHP regarding appropriate mitigations should Fairchild AFB be selected to host the MOB 1 scenario.
Grand Forks AFB MOB 1	No base-specific mitigation identified.

Table 2-22. Mitigation Measures to Reduce the Potential for Environmental Impacts (Continued)

<table>
<tr><th>Resource Area/Alternative</th><th>Mitigations Measures to Reduce the Potential for Environmental Impacts</th></tr>
<tr><td colspan="2">Cultural Resources (Continued)</td></tr>
<tr><td>McConnell AFB FTU</td><td>No base-specific mitigation identified.</td></tr>
<tr><td>McConnell AFB MOB 1</td><td>If McConnell AFB is selected to host the MOB 1 scenario, mitigation for adverse impacts to cultural resources would be required. Building 1106 is proposed for demolition under the MOB 1 scenario and this building has been determined to be eligible for listing on the NRHP. The demolition of Building 1106 cannot be avoided by any reasonable modifications to the proposed alternative. McConnell AFB has signed a MOA with the Kansas SHPO outlining the mitigation requirements for adverse impacts to Building 1106.
<u>Mitigation for Demolition of Building 1106</u>
McConnell AFB will provide materials for interpretive use by the Kansas Aviation Museum, Wichita, Kansas, in a “Military Aviation in Kansas” display. The materials may be photos, drawings, and/or historic summaries related to aviation at McConnell AFB. McConnell AFB is willing to provide these materials, which the Museum has expressed interest in displaying. Upon submittal of the full package, and receipt by the Museum, the materials become property of the Museum.
McConnell AFB will provide cultural resources related materials to the Wichita State University Libraries (the Library), Special Collections and University Archives, Wichita, Kansas; the SHPO will receive electronic copies of the materials. The source of materials is McConnell AFB Historic Records files and includes documents, photos, and/or drawings related to cultural resources at McConnell AFB. Examples include historic inventory reports, historic summaries, historic aerial photos, and limited original building elevation drawings of historic facilities. McConnell AFB is willing to provide these materials, which the Library has expressed interest in displaying.
McConnell AFB will ensure production of a “web page” suitable for internet posting, and a brochure useful for general distribution/accessibility to educate non-technical audiences within and beyond McConnell AFB. These products will focus on McConnell AFB's history in general, and will also incorporate historic buildings and their pertinent immediate and broader settings.
<u>Preservation of Buildings 1107 and 1218</u>
To ensure the MOB 1 does not adversely affect these buildings, McConnell AFB will ensure all phases of design, construction, and maintenance/operation of the buildings follow applicable provisions of “The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings” ("Standards"; 36 CFR Part 68).
McConnell AFB will provide opportunities for the SHPO to review and comment on key steps of MOB 1 related design for the buildings.
McConnell AFB will require all parties, including contractors, involved with design, construction, and maintenance/operation of the buildings follow the Standards. Where an individual or team involved in the buildings' design, construction, and maintenance/operation reasonably would be expected to meet professional standards associated with the Standards, McConnell AFB will ensure such standards are met.</td></tr>
</table>

Table 2-22. Mitigation Measures to Reduce the Potential for Environmental Impacts (Continued)

Resource Area/Alternative	Mitigations Measures to Reduce the Potential for Environmental Impacts
Land Use	
All Bases	No base-specific mitigation identified.
Infrastructure	
All Bases	No base-specific mitigation identified.
Hazardous Materials and Waste	
All Bases	No base-specific mitigation identified.
Socioeconomics	
All Bases	No base-specific mitigation identified.
Environmental Justice and Protection of Children	
All Bases	No base-specific mitigation identified.

2.9 MANAGEMENT ACTIONS

In addition to mitigation measures, the EIS has identified a series of management actions. These management actions will be implemented in accordance with applicable regulations or USAF guidance. Specific management actions identified in the Final EIS are presented in Table 2-23. The table presents the management actions by resource area, base, and mission.

2.10 UNAVOIDABLE IMPACTS

At a few locations near the four bases, KC-46A development and aircraft operations could result in disturbance and/or noise in areas that are not currently or have not recently been subjected to these effects. Some of these impacts could be considered adverse or annoying to potentially affected individuals. Potential impacts that could occur and cannot be mitigated include the following:

- With the exception of the MOB 1 scenario at McConnell AFB, an increase in the number of acres and estimated number of residents exposed to noise levels equal to or greater than 65 dB DNL would occur.
- The existing capacity of regional landfills would be reduced due to the solid waste generated.
- Although anticipated to be similar to what is currently or what was recently being generated at all four bases, hazardous and nonhazardous waste would be generated as a result of maintenance functions associated with the new aircraft.
- Individual species would be affected by land disturbance and air operations.
- Stormwater runoff and associated erosion would increase due to construction.
- The level of service on a number of roadway segments could decrease.
- There is potential for an increase in the number of bird/wildlife-aircraft strikes and aircraft mishaps resulting from the increased number of annual operations.

Table 2–23. Management Actions to Reduce the Potential for Environmental Impacts

Resource Area/Alternative	Management Actions to Reduce the Potential for Environmental Impacts
Noise	
Altus AFB FTU	• KC-46A aircrews would mirror existing tanker operations making use of traffic patterns to the west, as well as east of Altus AFB. • KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M. • Auxiliary airfields will generally not be used by KC-46A aircrews between 10:00 P.M. and 7:00 A.M.
Altus AFB MOB 1	• KC-46A aircrews would mirror existing tanker operations making use of traffic patterns to the west, as well as east of Altus AFB. • KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.
Fairchild AFB MOB 1	• KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.
Grand Forks AFB MOB 1	• KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.
McConnell AFB FTU	• Auxiliary airfields will generally not be used by KC-46A aircrews between 10:00 P.M. and 7:00 A.M.
McConnell AFB MOB 1	• KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.
Air Quality	
All Bases	Employ fugitive dust control and soil retention practices including: • Water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area. • Suspension of all soil disturbance activities when visible dust plumes emanate from the site. • Designating personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site.
Safety	
All Bases	• Existing, and in the case of Grand Forks AFB, former KC-135 emergency fuel jettison locations and procedures would be used for all KC-46A missions. • Emergency and mishap response plans would be updated to address the needed procedures and response actions specific to the KC-46A airframe.

Table 2–23. Management Actions to Reduce the Potential for Environmental Impacts (Continued)

Resource Area/Alternative	Management Actions to Reduce the Potential for Environmental Impacts
Soils and Water	
All Bases	• Update installation Storm Water Pollution Prevention Plans (SWPPPs) to reflect new KC-46A building construction as required by state and federal CWA requirements. • Post construction, all disturbed areas would be re-graded to pre-construction contours. • Silt fence, interceptor trenches, hay bales, or other suitable erosion and sediment control measures will be used during construction, and revegetation of disturbed areas will occur as soon as practical.
Altus AFB FTU	• No base-specific management actions identified.
Altus AFB MOB 1	• Submit stamped engineering plans and specifications for any work associated with the Bureau of Reclamation-owned irrigation canal prior to construction.
Fairchild AFB MOB 1	• No base-specific management actions identified.
Grand Forks AFB MOB 1	• No base-specific management actions identified.
McConnell AFB FTU	• Continue best management practices to reduce stormwater runoff containing deicing fluid. These would include monitoring, inspection, and replacement of valves, and flushing of deicing system prior to opening diversion valves.
McConnell AFB MOB 1	• Continue best management practices to reduce stormwater runoff containing deicing fluid. These would include monitoring, inspection, and replacement of valves, and flushing of deicing system prior to opening diversion valves. • The proposed addition to Building 1220 is located in a 100-year floodplain. To the maximum extent practical, work in the 100-year floodplain would be minimized. • The proposed addition would be constructed above the base flood level.
Biological Resources	
All Bases	• Continue adherence to Bird/Wildlife Aircraft Strike Hazard (BASH) program.
Cultural Resources	
All Bases	• Track results of government-to-government consultation with tribes. • In the case of unanticipated or inadvertent cultural resource discoveries, the USAF would comply with Section 106 of the NHPA and follow the standard operating procedures outlined in the Integrated Cultural Resource Management Plan (ICRMP).
Land Use	
All Bases	• Once the full complement of KC-46A aircraft are operating at both bases, prepare an update to the current Air Installation Compatible Use Zone Study (AICUZ) to validate operational data and identify projected noise levels based on the most recent noise data.

Table 2–23. Management Actions to Reduce the Potential for Environmental Impacts (Continued)

Resource Area/Alternative	Management Actions to Reduce the Potential for Environmental Impacts
Infrastructure	
All Bases	• Incorporate Leadership in Energy and Environmental Design (LEED) and sustainable development concepts into construction projects to achieve optimum resource efficiency, sustainability, and energy conservation, except to the extent limited or prohibited by law. • Continue and enhance recycling and reuse programs to accommodate waste generated by the KC-46A beddown.
Hazardous Materials and Waste	
All Bases	• Update Hazardous Waste Management Plans to account for any new and/or changed waste streams or new procedures, if any, for managing hazardous materials and wastes associated with KC-46A aircraft. • Review construction plans to identify any monitoring wells that would need to be removed and/or replaced. • Review construction plans to identify any buildings containing toxic substances such as lead-based paint (LBP) and asbestos.
Socioeconomics	
Altus AFB FTU	• No base-specific management actions identified.
Altus AFB MOB 1	• Complete a Housing Requirements and Market Analysis (HRMA).
Fairchild AFB MOB 1	• Complete an HRMA.
Grand Forks AFB MOB 1	• Complete an HRMA.
McConnell AFB FTU	• Complete an HRMA.
McConnell AFB MOB 1	• Complete an HRMA.
Environmental Justice and Protection of Children	
All Bases	• No base-specific management actions identified.

CHAPTER 3

BASE-AFFECTED ENVIRONMENT

3.0 BASE-AFFECTED ENVIRONMENT

This chapter is alphabetically organized by each of the four Air Force Bases (AFBs) under consideration for the KC-46A Formal Training Unit (FTU) and First Main Operating Base (MOB 1) missions. The baseline or existing condition information, organized by resource area in each of the four base sections, forms the basis for the comparative analysis presented in the summary table at the end of Chapter 2 (Table 2-21). The U.S. Air Force (USAF) evaluates and compares operational and economic factors and environmental resources to determine whether to make a beddown decision at this time and, if such a decision is made, where the FTU and MOB 1 KC-46A missions would be located. The baseline conditions described in this chapter constitute conditions under the No Action Alternative.

The geographic scope of potential consequences, known as a region of influence (ROI), is described for each resource area. For most of the resource areas, the ROI is defined as areas of the base affected by aircraft operations and infrastructure upgrades. For some resources (such as noise, air quality, and socioeconomics), the ROI extends into surrounding communities unique to that specific resource area. The ROI for the FTU mission also includes the local airspace associated with the auxiliary airfields required for use by KC-46A aircraft.

The goal in producing this Final Environmental Impact Statement (EIS) has been to prepare as concise a document as possible that addresses the base-specific concerns of individuals, agencies and others while meeting the comparative needs of the USAF decision makers. Public, agency, and other comments received during scoping were used to focus the analysis on those environmental resources of interest to scoping participants. Certain environmental resources were not carried forward for separate evaluation in this Final EIS because it was determined that implementation of the KC-46A FTU or MOB 1 mission at any of the alternative bases would be unlikely to affect those resources. Airspace management and visual resources were not evaluated because there will be no new airspace proposed and no changes to the manner in which the existing airspace is used. Resource definitions, as well as the regulatory setting and methodology of the analysis, are contained in Volume II, Appendix B.

3.1 ALTUS AIR FORCE BASE

This section of Chapter 3 describes the baseline conditions of the environmental resources anticipated to be affected by implementation of the KC-46A FTU or MOB 1 scenario at Altus AFB and, when applicable, in areas surrounding the base. The baseline resource conditions are described to the level of detail necessary to support analysis of the potential impacts that could result from implementation of the KC-46A FTU or MOB 1 scenario at Altus AFB.

3.1.1 Noise

Noise, which is defined as unwanted sound, has the potential to affect several resource areas evaluated in this Final EIS. Background information on the regulatory setting and methodology for noise is contained in Volume II, Appendix B, Sections B.1.2 and B.1.3.

3.1.1.1 Base-Affected Environment

The current mission at Altus AFB is described in Section 2.4.1 and includes both C-17 and KC-135 aircraft. Table 3-1 shows noise levels of the aircraft currently based at Altus AFB at different heights above the ground during landings and takeoffs. Aircraft flying at higher altitudes may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly

lower noise levels than shown in Table 3-1. The noise levels in this table are presented as sound exposure levels (SELs) in decibels (dB), which are the sum of sound energy during the noise event.

Table 3-1. Aircraft Noise Levels at Altus AFB

Aircraft	Power Setting	SEL at Overflight Distance (in dB)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
C-17	1.15 EPR	108	102	95	88	77	68
KC-135	65% NF	100	95	90	84	75	67
Takeoff							
C-17	1.42 EPR	114	109	103	97	88	81
KC-135	90% NF	105	100	95	90	81	73

Note: Aircraft airspeed is 160 knots. Aircraft operate at various airspeeds in and around the airfield.
Key: Power Units: EPR – engine pressure ratio; NF – engine fan revolutions per minute.
Source: NOISEMAP 7.2 Maximum Omega 10 Results.

Of the 109,459 annual operations conducted at Altus AFB, 12 percent occur during the night between 10:00 P.M. and 7:00 A.M. Due to the potential for night noise to be particularly intrusive, noise events occurring during this time period are assessed a 10 dB penalty when calculating day-night average sound level (DNL).

The baseline noise contours shown on Figure 3-1 reflect the current level of operations at Altus AFB and were created using NOISEMAP (Version 7.2). As a point of reference, the 65 dB DNL noise contours, as published in the 2010 Air Installation Compatible Use Zone (AICUZ) report, are also shown. The relatively minor differences in noise contours result from an update of operations data based on interviews with pilots, maintainers, and air traffic control personnel as well as use of refined noise modeling algorithms in calculation of the baseline noise levels. The refined noise modeling algorithms take into account local variation in terrain (e.g., hills and valleys) and ground impedance (e.g., grass absorbs sound energy to a greater degree than water).

Table 3-2 shows the number of on- and off-base acres and estimated residents currently exposed to noise levels greater than 65 dB DNL. People regularly exposed to elevated noise levels are more likely to become annoyed by the noise. It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed, and this has been accepted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.1.7 and Volume II, Appendix C, Section C.1.3.1).

Table 3-2. Population and Acreage Affected Under Noise Contours Near Altus AFB, Baseline Conditions

Noise Level (dB DNL)	Baseline Conditions		
	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	97	3,433	961
70–74	22	945	914
75–79	2	191	627
80–84	0	5	467
≥85	0	0	87
Total	**121**	**4,574**	**3,056**

Note: Population estimates based on 2010 U.S. Census Bureau data. See Volume II, Appendix C, Section C.4, for more information on methods used to estimate number of residents affected.

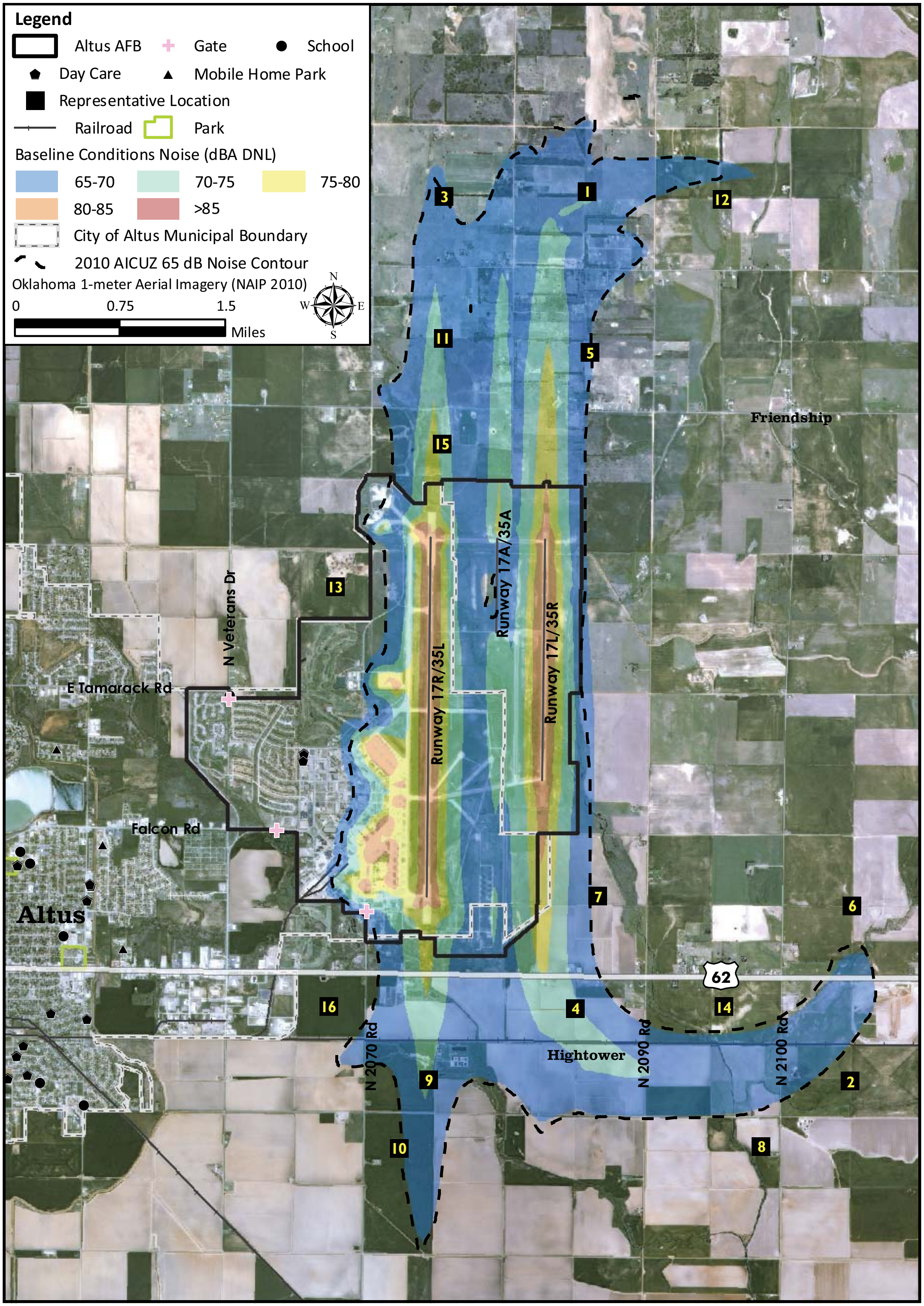

Figure 3-1. Altus AFB Baseline Noise Contours

Per U.S. Department of Defense (DoD) policy, the 80 dB DNL noise contour is used to identify populations most at risk of potential hearing loss (USD 2009). If no residence or populated area is within the 80 dB DNL contour, then no further risk assessment is warranted. Noise levels greater than 80 dB DNL affect 5 acres of off-base land outside of Altus AFB, but examination of aerial photography shows no residences in the affected area. On base, 4 buildings located along the flightline are affected by noise levels of 80 dB DNL or greater. None of the affected buildings are residential. The risk of hearing loss among workers at Altus AFB is managed according to DoD regulations for occupational noise exposure. Occupational Safety and Health Administration (OSHA) and National Institute for Occupational Safety and Health (NIOSH) occupational noise exposure regulations would continue to be enforced to protect employees of Altus AFB.

Table 3-3 presents noise conditions at several representative locations surrounding Altus AFB. The representative locations, shown on Figure 3-1, were established based on central points of U.S. Census subdivisions, and therefore do not represent a specific noise-sensitive receptor. The areas in the vicinity of the representative locations are expected to experience similar aircraft noise levels. Eight of the 16 locations currently experience noise levels greater than 65 dB DNL. Based C-17 and transient T-38 arrival and closed pattern operations generate the highest SELs at the majority of the locations analyzed. Table C-1-1 in Volume II, Appendix C, Attachment C-1, provides details regarding the operations types generating the highest SELs at each location.

Table 3-3. Altus AFB Representative Locations Under Baseline Conditions

Location ID	Baseline Conditions	
	DNL (dB)	Top 5 SELs (dB)[a]
1	69	99–107
2	62	91–97
3	66	99–102
4	71	97–102
5	65	98–101
6	62	92–97
7	67	98–101
8	61	90–94
9	71	103–104
10	64	96–101
11	70	102–104
12	63	92–98
13	58	91–93
14	63	93–98
15	73	105–106
16	60	90–95

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Volume II, Appendix C, Attachment C-1).

Base flying procedures are designed to minimize impacts on the surrounding community while maximizing operational capacity and flexibility. For example, Air Force Instruction (AFI) 13-203 instructs aircrews not to overfly densely populated portions of the City of Altus at less than 4,500 feet mean sea level (MSL) (about 3,100 feet above ground level [AGL]). Similarly, aircraft departing Altus AFB under instrument flight rules are not issued instruction for westward turns until they are at or above 3,500 feet MSL (about 2,100 feet AGL). Although flights over the City of Altus are generally kept to a minimum, a western aircraft traffic pattern (which overflies the city) was introduced in 2010 to increase peak operational capacity of the

base. Following introduction of the western pattern, there was an increase in community noise complaints. Currently, approximately 25 percent of closed pattern operations occur to the west of the base.

3.1.2 Air Quality

Air quality in a given location is defined by the size and topography of the air basin, the local and regional meteorological influences, and the types and concentrations of pollutants in the atmosphere, which are generally expressed in units of parts per million or micrograms per cubic meter. One aspect of significance is a pollutant’s concentration in comparison to a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare and include a reasonable margin of safety to protect the more sensitive individuals in the population.

The Clean Air Act (CAA) (42 *U.S. Code* [USC] 7401–7671q, as amended) provided the authority for the U.S. Environmental Protection Agency (USEPA) to establish ambient air quality standards to protect public health and welfare nationwide. National Ambient Air Quality Standards (NAAQS) exist for seven pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. The NAAQS are listed in Volume II, Appendix B, Section B.2.1.

The CAA establishes air quality regulations and the NAAQS, and delegates the enforcement of these standards to the states. The CAA requires areas in nonattainment of an NAAQS to develop a State Implementation Plan (SIP) that details how the state will attain the standard within mandated timeframes. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area.

CAA Section 176(c) and USEPA’s General Conformity implementing regulation generally prohibits federal agencies from engaging in, supporting, permitting, or approving any activity that does not conform to the most recent USEPA-approved SIP in nonattainment or maintenance areas. This means that federal projects in such areas or other activities using federal funds or requiring federal approval (1) will not cause or contribute to any new violation of an NAAQS; (2) will not increase the frequency or severity of any existing violation; or (3) will not delay the timely attainment of any standard, interim emission reduction, or other milestone. The General Conformity Rule applies to Federal actions affecting areas that are in nonattainment of an NAAQS or are designated maintenance areas. Conformity requirements only apply to nonattainment and maintenance pollutants and their precursor emissions. Conformity determinations are required when the annual direct and indirect emissions from a proposed Federal action equal or exceed an applicable de minimis threshold. These thresholds are lower for more severe nonattainment conditions. The General Conformity Rule only applies to proposed KC-46A operations from Altus AFB that would occur within the serious O_3 nonattainment area that encompasses the Fort Worth Alliance Airport (AFW) auxiliary airfield. Proposed KC-46A operations within this area would conform to the applicable SIP if their annual emissions remain below 50 tons per year of volatile organic compounds (VOCs) or nitrogen oxides (NO_x).

Hazardous air pollutants (HAPs) are air pollutants known or suspected to cause serious health effects, such as birth defects or cancer, or adverse environmental effects. HAPs are compounds that generally have no established ambient standards. The CAA identifies 187 substances as HAPs (e.g., benzene, formaldehyde, mercury, and toluene). HAPs are emitted from a range of industrial facilities and vehicles, such as aircraft. The USEPA sets Federal regulations to reduce

HAP emissions from stationary sources. A "major" source of HAPs under the Federal Title V Operating Program is defined as any stationary facility or source that directly emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of combined HAPs.

In Oklahoma, the Air Quality Division of the Oklahoma Department of Environmental Quality (ODEQ) is responsible for enforcing air pollution regulations. The Air Quality Division enforces the NAAQS by monitoring state-wide air quality and developing rules to regulate and permit stationary sources of air emissions. The Oklahoma Air Quality Rules are found in the *Oklahoma Administrative Code* Title 252, Chapter 100 (Department of Environmental Quality Air Pollution Control).

Greenhouse gases (GHGs) trap heat in the atmosphere. Both natural processes and human activities generate these emissions. The accumulation of GHGs in the atmosphere regulates the earth's temperature. Volume II, Appendix B, Section B.2.1.1, describes recent conditions regarding climate change and impacts on the United States, as obtained from the U.S. Global Change Research Program report, *Global Climate Change Impacts in the United States* (USGCRP 2009).

GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide, O_3, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the earth's surface. The GWP of a particular gas provides a relative basis for calculating its carbon dioxide equivalent (CO_{2e}) or the amount of CO_2 that emissions of that gas would be equal to; CO_2 has a GWP of 1 and is, therefore, the standard by which all other GHGs are measured.

Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project alternatives have been quantified to the extent feasible in this Final EIS for information and comparison purposes.

3.1.2.1 Region of Influence and Existing Air Quality

Air emissions produced from construction and operation of the KC-46A aircraft at Altus AFB would mainly affect air quality within Jackson County. KC-46A operations associated with the FTU scenario would also affect air quality in the immediate vicinity of auxiliary airfields and along aircraft flight routes between these locations. Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as CO and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as O_3 may extend much farther downwind than for inert pollutants. O_3 is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. O_3 precursors are mainly NO_x and photochemically reactive VOCs. In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from their source.

Currently, Jackson County is in attainment of the NAAQS for all pollutants. The areas surrounding the auxiliary airfields proposed for use by the FTU scenario attain all of the NAAQS with the exception of AFW, which is in serious nonattainment of the O_3 NAAQS.

3.1.2.1.1 Regional Air Emissions

Table 3-4 summarizes estimates of the annual emissions generated by Jackson County in calendar year (CY) 2008 (USEPA 2013a). The majority of emissions within the region occur from (1) on-road and nonroad mobile sources (VOCs, CO, and NO_x), (2) solvent/surface coating usages (VOCs), and (3) fugitive dust (PM_{10}/$PM_{2.5}$).

Table 3-4. Annual Emissions for Jackson County, Oklahoma, CY 2008

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Stationary Sources	7,012	3,429	825	37	9,171	1,632	17,222
Mobile Sources	407	4,302	1,144	15	69	60	184,699
Total	**7,419**	**7,731**	**1,969**	**52**	**9,240**	**1,692**	**201,920**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons
Source: USEPA 2013a.

3.1.2.1.2 Altus AFB Emissions

Operational emissions due to existing operations at Altus AFB occur from (1) aircraft operations and engine maintenance/testing, (2) aerospace ground equipment (AGE), onsite government motor vehicles (GMVs) and privately owned vehicles (POVs), (3) offsite POV commutes, (4) nonroad mobile equipment, (5) mobile fuel transfer operations, and (6) stationary and area sources. Table 3-5 summarizes the most recent estimate of annual operational emissions that occurred at Altus AFB (CY 2012). These data were developed in part from the *2008 Mobile Source Air Emissions Inventory for Altus Air Force Base* (Weston Solutions, Incorporated 2010). Emission factors used to calculate combustive emissions for the KC-135 aircraft were based on emissions data developed by CFM International for the CFM56-2B1 engine (ICAO 2013a). The data in Table 3-5 are also used to estimate non-aircraft source emissions for future project scenarios at Altus AFB. Volume II, Appendix D, Section D.1.1, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from existing sources at Altus AFB.

Table 3-5. Annual Emissions from Existing Operations at Altus AFB, CY 2012

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
C-17 Aircraft Operations	25.92	234.56	811.10	68.54	202.86	202.86	115,409
KC-135 Aircraft Operations	3.87	155.10	210.64	35.75	52.00	52.00	60,195
Transient Aircraft Operations	1.38	5.07	3.15	0.31	0.77	0.77	530
On-Wing Aircraft Engine Testing – C-17	0.16	7.77	9.77	0.64	4.24	4.24	1,796
On-Wing Aircraft Engine Testing – KC-135	0.99	14.32	7.07	0.82	0.05	0.05	2,278
Aerospace Ground Support Equipment	0.84	6.08	7.11	0.20	0.94	0.86	4,741
Government-Owned Vehicles	0.11	0.98	2.34	0.00	0.13	0.11	443
Privately Owned Vehicles – On Base	0.23	8.09	1.49	0.02	0.07	0.04	1,089

Table 3-5. Annual Emissions from Existing Operations at Altus AFB, CY 2012 (Continued)

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Privately Owned Vehicles – Off Base	0.72	24.03	3.95	0.05	0.29	0.13	3,109
Nonroad Equipment	8.29	111.38	3.12	0.45	0.34	0.34	2,178
Mobile Fuel Transfer Operations	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Point and Area Sources	1.91	5.85	9.65	0.17	0.00	0.00	0.00
Total Emissions	**55.39**	**573.25**	**1,069.38**	**106.96**	**262.74**	**261.86**	**191,769**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

3.1.3 Safety

The safety resource area applies to activities in the air and on the ground associated with aircraft flight and operation. Flight safety considers the aircraft flight risks, including the potential for bird/wildlife-aircraft strike hazard. Ground safety considers issues associated with operations and maintenance activities that support base operations, including fire response. Background information on the regulatory setting and methodology for safety is contained in Volume II, Appendix B, Sections B.3.2 and B.3.3.

3.1.3.1 Flight Safety

In the previous 9 years (2003–2012), there were four Class A mishaps at Altus AFB, none of which were crashes and/or resulted in the loss of an aircraft. Three historical Class A accidents involving Altus-based aircraft occurred between 1962 and 2002 and involved loss of the aircraft. Two involved a KC-135 (in 1962 and 1987) and another (in 1974) involved a C-5 aircraft (Aviation Safety Network 2013a).

The KC-135 and the future KC-46A have the ability to jettison fuel during emergency situations. Data on historical KC-135 operations show that slightly less than two sorties per thousand resulted in a release of fuel (AMC 2013). The ability to land the KC-46A at a much higher weight than the KC-135 would be expected to reduce the frequency of fuel releases for the KC-46A. As such, it is expected that KC-46A sorties would experience a lower frequency of fuel releases.

It is USAF Air Education and Training Command (AETC) policy to follow AFIs that have been established to avoid fuel jettison, unless safety of flight dictates immediate jettison. Air Mobility Command (AMC) policy, which covers all USAF tanker assets, requires that, whenever possible, any fuel released from an aircraft must occur above 20,000 feet AGL (AMC 2004, 2012). This policy is designed to minimize potential impacts of fuel jettison events.

The main environmental concern from fuel released from an aircraft is the deposition of fuel onto the ground and/or surface waters and subsequent negative impact on human health or natural resources. The results of a definitive study on the fate of jettisoned fuel from large USAF aircraft (e.g., KC-135) (Deepti 2003) were used to identify a reasonably conservative ground-level fuel deposition value for the KC-46A. This study used the Fuel Jettison Simulation model developed by the USAF to estimate the ground deposition of fuel from jettison events (Teske and Curbishley 2000). This maximum ground-level fuel deposition value identified for the KC-46A would result in effects that are well below known natural resource and human health thresholds

for jet fuel. Therefore, the maximum fuel deposition value expected from the KC-46A would not produce substantial impacts on human health or natural resources. In view of this, no further analysis is included in this section.

3.1.3.1.1 Wildlife Strike Hazard at Altus AFB and Vicinity

A bird/wildlife-aircraft strike hazard exists at Altus AFB and its vicinity due to resident and migratory bird species and other wildlife. Daily and seasonal bird movements create various hazardous conditions. While birds cannot be totally eliminated from the flight environment, measures can be taken that reduce the potential for and number of potentially hazardous bird strikes by aircraft at or near Altus AFB. Such actions prevent damage to aircraft and preserve lives and valuable resources.

Altus AFB is located along the Mid-Continental Flyway for migratory birds. Some of the species creating a hazard in this area include cattle egrets, hawks, kites, quails, and cranes. In addition to the bird species, mammals such as rabbits, hares, and occasionally coyotes wander onto the airfield and can be strike hazards.

The Altus AFB Bird/Wildlife-Aircraft Strike Hazard (BASH) Plan establishes procedures to minimize this hazard, including the removal or control of bird attractants, as well as depredation methods such as bird hunts (Altus AFB 2012a). The adopted BASH Plan establishes implementation procedures and actions that can be taken to minimize the potential of bird-aircraft strikes. Such measures include eliminating broad-leaf weeds, maintaining grass heights between 7 and 14 inches, removing perch sites and brushy or forested areas, reducing or eliminating standing water, planting non-seeding grasses or mowing before seed heads develop, and scheduling aircraft flying hours to avoid peak bird flying times.

The 97th Air Mobility Wing (AMW) has the responsibility to implement the approved BASH Plan. The BASH Plan also establishes the Bird Hazard Working Group, composed of representatives of flight safety, civil engineering, airfield management/base operations, air traffic control, operations, and other concerned organizations. For the period from Fiscal Year (FY) 2009 through FY 2012, Altus AFB personnel recorded 479 bird strikes in the airfield and airspace.

3.1.3.2 Ground Safety

Altus AFB, the City of Altus, and Jackson County, Oklahoma, work collaboratively to protect the health and welfare of the surrounding community while also protecting the military mission and taxpayers' investment in Altus AFB. The specific noise exposure levels from aircraft operations in the vicinity of Altus AFB and the boundaries of the clear zones (CZs) and accident potential zones (APZs) have been released to local governments for their use in planning documents as part of the 1999 Joint Land Use Study (JLUS). All of the CZs for the runways at Altus AFB overlie government property or open land.

One building (Building 445) on Altus AFB is located within the CZ. The building is programmed for demolition as part of the Airfield Obstruction Reduction Initiative and a replacement facility has been identified. Currently, aircraft parked in 15 spots (1–8 and 41–47) on the south ramp are in violation of airfield criteria. APZs I and II extend off base to the north and south for Runway 17L/35R and 17R/35L and have a few low-density residential structures.

Capability for fire response is located on base and in the local communities. The base fire department is party to mutual-aid support agreements with the nearby communities.

3.1.4 Soils and Water

3.1.4.1 Soil Resources

Altus AFB is located in the Central Redbud Plains area of the Central Lowlands physiographic region and within the geological province known as the Hollis Basin. The area surrounding the base is relatively flat and gently sloping from north to south with elevations ranging from 1,390 to 1,330 feet (Altus AFB 2009a). Soil underlying the base is primarily of the Tillman-Hollister and Miles-Nobscot associations (Altus AFB 2003). The Tillman-Hollister soils are very deep and well-drained (USDA 2002a, 2003). The textures of the Tillman-Hollister soils range from clay loam to clay, with the Hollister subsurface soils being more clayey in nature (Altus AFB 2009a). The Miles-Nobscot soils are very deep, well-drained, and moderately permeable; the Miles soils are nearly level to moderately sloping, and the Nobscot soils occur on undulating to hilly stream terraces (USDA 2002b, 2005a). The textures of the Miles-Nobscot soils range from sandy to sandy loam to sandy clay loam, with the Nobscot soils having a more sandy nature, especially in the surface soils (Altus AFB 2009a).

3.1.4.2 Water Resources

3.1.4.2.1 Surface Water

The North Fork and Salt Fork of the Red River, the major drainages of the area, are located approximately 13 miles east and 5 miles west of the base, respectively. The Tom Steed Reservoir is located approximately 15 miles northeast of the base. Surface water features on base include a couple of small impoundments, a sewage lagoon and stormwater catch basin (Altus AFB 2009a). Two watercourses (a tributary to the Ozark canal and a surface water drainage) cross the base boundary and extend under the main runway; however, both are contained by earthen levees and receive no surface water drainage from the base. Altus AFB is not located within and does not drain to any sensitive waters or watersheds (Altus AFB 2010a).

A system of underground pipes and catchment basins, with associated drainage structures, collect stormwater run-off from the base. Run-off is conveyed by ditches and streams and discharged through one of four outfalls (001–004), which are covered under the Oklahoma Pollutant Discharge Elimination System Stormwater Industrial General Permit OKR05. Each outfall has a weir, and selected parking lots have flumes to aid in preventing petroleum and oils from discharging from the base (Altus AFB 2010a). Discharge from the four outfalls flows into one of two streams, Stinking Creek and an unnamed tributary of Stinking Creek. These streams flow in a northwesterly to southeasterly direction and join prior to discharging to the North Fork of the Red River, approximately 13 miles south of the base. Stinking Creek captures drainage from the northern and eastern portions of the base, and the unnamed tributary captures drainage from the housing area and southern portion of the base (Altus AFB 2010a).

To manage on-base stormwater run-off and to protect the quality of surface water on base and in the vicinity of the base, Altus AFB has been issued a National Pollutant Discharge Elimination System (NPDES) general stormwater permit. As a part of this permit, the base analyzes stormwater samples for all permit-required parameters. The permit also requires quarterly visual monitoring, during which parameters such as color, odor, clarity/turbidity, floating and settled solids, suspended solids, foam, and oil are evaluated (Altus AFB 2010a). Stormwater discharges have historically been in compliance with permit requirements (Wallace 2013a).

3.1.4.2.2 Groundwater

There are no significant aquifers underlying Altus AFB. There is very little groundwater found in the area; the limited amount of groundwater that exists is non-potable due to the high suspended solid and gypsum content (Altus AFB 2009a). Shallow groundwater at the base ranges from 1–10 feet in depth and generally flows to the south-southeast (Altus AFB 2009b).

3.1.4.2.3 Floodplains

Portions of Altus AFB are located within the 100-year floodplain. The areas located within the 100-year floodplain primarily include the northeastern portion of the airfield and the residential area located in the southwestern portion of the base (Altus AFB 2009a).

3.1.5 Biological Resources

3.1.5.1 Vegetation

Mixed grass prairie historically dominated the land associated with and surrounding Altus AFB (Altus AFB 2009a). Oklahoma mixed grass prairie ecosystems are described in detail by the Oklahoma Department of Wildlife Conservation (ODWC 2005). Most of the natural vegetative community in the vicinity of the base was altered or eliminated by agricultural activities prior to construction of the base. Much of the undeveloped areas in this region continue to be mixed grass prairie.

Improved areas of the base include developed areas that have lawns and landscape plants that require maintenance (Altus AFB 2009a). Hundreds of trees have been planted on base since its development; however, there are very few native species of trees in this area (Altus AFB 2003). Attempts to establish trees on base have been difficult because of extreme temperatures, lack of moisture, and clay soils with high salt content. Vegetation management at Altus AFB is guided by the Integrated Natural Resource Management Plan (INRMP), the Land Management and Grounds Maintenance Plan, the Wetlands and Floodplain Management Plan, and the BASH Plan (Altus AFB 2009a).

3.1.5.2 Wildlife

Information on wildlife occurring on Altus AFB is provided in the INRMP (Altus AFB 2009a). Native wildlife documented on the base includes a variety of mammals and birds. White-tailed deer (*Odocoileus virginianus*) and coyotes (*Canis latrans*) are the most common large mammals, and the eastern cottontail rabbit (*Sylvilagus floridanus*), the black-tailed jackrabbit (*Lepus californicus*), and the thirteen lined ground squirrel (*Spermophilus tridecemlineatus*) are the most common small mammals (Altus AFB 2004). Although no amphibians or reptiles have been identified on Altus AFB, a variety are known to occur in Jackson County, the most common of which are the common garter snake (*Thamnophis sirtalis*), common water snake (*Nerodia sipedon*), bullfrog (*Rana catesbeiana*), king snake (*Lampropeltis* spp.), and common snapping turtle (*Chelydra serpentine*).

Altus AFB is located within the Mid-Continental Flyway (USFWS 2013a), which is a bird migration corridor generally designated for waterfowl and managed by state governments and the U.S. Fish and Wildlife Service (USFWS). Therefore, a large number of geese and ducks may occur in the general region during migration seasons. However, water habitats are limited on the base (Altus AFB 2009a).

3.1.5.3 Special-Status Species

Although no special-status species are known to occur at Altus AFB, three federally listed bird species have the potential to occur in Jackson County, Oklahoma (see Table 3-6) (OKWC 2013; USFWS 2013b). Many birds protected under the Migratory Bird Treaty Act occur as residents or migrants near Altus AFB. There is no critical habitat known to occur on base (USFWS 2013c).

Table 3-6. Special-Status Species that Could Occur at Altus AFB

Common Name	Scientific Name	Status		Occurrence at Altus AFB
		Federal[a]	State[b]	
Birds				
Piping plover	*Charadrius melodus*	FC, MBTA	-	No
Whooping crane	*Grus americana*	FE, MBTA	-	No
Interior least tern	*Sterna antillarum*	FE, MBTA	-	No

[a] U.S. Fish and Wildlife Service
[b] Oklahoma Department of Wildlife Conservation
Key: FC – candidate for Federal listing; FE – listed as endangered under the Endangered Species Act; MBTA – protected under the Migratory Bird Treaty Act
Source: Altus AFB 2009a; OKWC 2013; USFWS 2013b.

3.1.5.4 Wetlands

Wetlands are limited to a few areas along Stinking Creek, an unnamed tributary, the Ozark Canal, and a few emergent wetlands scattered throughout the base. The small emergent wetlands are near the percolation basins associated with treatment systems at adjacent facilities and golf course water hazards (Altus AFB 1994). Wetlands on Altus AFB make up less than 1 acre of the base (Altus AFB 2009c).

3.1.6 Cultural Resources

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources.

3.1.6.1 Architectural

All buildings on Altus AFB have been evaluated for National Register of Historic Places (NRHP) eligibility. A 2003 Cold War-era inventory and assessment (AETC 2003) inventoried 16 buildings and one structure. The Oklahoma State Historic Preservation Office (SHPO) determined that none of the inventoried buildings/structures were eligible for inclusion on the NRHP. In 2013, the 97 AMW completed a historic property assessment (97 AMW 2013) of 13 facilities on the base to comply with Section 110 of the National Historic Preservation Act (NHPA). The architectural resources were evaluated based on their age and on their association with the Cold War (1945–1989) mission at Altus AFB. Altus AFB has determined that Building 285 is eligible for inclusion on the NRHP, and the SHPO has concurred.

3.1.6.2 Archaeological

Four archaeological surveys have been conducted on Altus AFB since 1987, resulting in the documentation of 10 historic archaeological sites and two historic isolated finds (Altus AFB 2009d; Baugh 1987; DeVore 1989, 1991). The entire base has been surveyed for archaeological resources (Altus AFB 2009d). There are no NRHP-eligible archaeological resources on the base.

3.1.6.3 Traditional

Altus AFB has identified 10 tribes typically consulted with as part of the National Environmental Policy Act (NEPA) and Section 106 processes. These tribes are listed in Table A-1 in Volume II, Appendix A, Section A.3. There are no known tribal sacred sites or properties of traditional religious and cultural importance in the vicinity of Altus AFB.

3.1.7 Land Use

Altus AFB is located in a rural area of Jackson County, Oklahoma, on the eastern edge of the City of Altus. The City of Altus is a community of about 20,000 residents. Land use surrounding Altus AFB is predominantly agricultural.

3.1.7.1 Base

Altus AFB recently updated its General Plan (GP), which includes a description of the physical development on the base, with the layout of functional areas and land uses. The east side of the base is dedicated to the airfield (centered around two parallel runways and an assault landing zone on a north-south alignment). Industrial functions, recreational areas, open space, and housing areas occupy much of the remainder of the base on the west side of the airfield, with the family housing located closest to the City of Altus.

Access to the base is through three gates. Both the Main Gate and the North Gate into the housing area are accessed directly from the east side of the City of Altus along Falcon Road and East Tamarack Road, respectively. The Southern Gate serves limited access into industrial areas with a short access road from U.S. Highway 62.

The base provides recreational amenities for base personnel and family members. Outdoor recreational areas are located on the northwest side of the main cantonment area and on the southern side of the housing area. Available opportunities include two parks, playgrounds, picnic areas, family camp, two swimming pools, and an 18-hole golf course (Altus AFB 2003).

3.1.7.2 Surrounding Areas

As shown on Figure 3-1, the land surrounding Altus AFB to the south, east, and north is primarily agricultural with a few commercial and industrial sites and isolated home sites. Residential properties are located in the vicinity of U.S. Highway 62 and N2100 Road, and to the north of the airfield between the base boundary and E1580 Road to the north, N2090 Road to the east, and N2070 Road to the west.

Compatibility planning has been on the forefront of planning for the area around Altus AFB for over a decade. The USAF provides land use recommendations to local jurisdiction through the AICUZ program. The DoD AICUZ program recommends compatible land uses based on predicted noise exposure in areas surrounding an airfield. The USAF has adopted the recommendations used by the U.S. Department of Housing and Urban Development, the Federal Aviation Administration (FAA), and the USEPA as a common standard for assessing noise levels and compatibility with land uses. The DoD AICUZ program also assesses accident potential and outlines compatible uses based on safety factors for areas nearest to the runway ends.

Altus AFB prepared an AICUZ study in 1999, which included both C-5 and C-141 operations. The last C-5 left Altus AFB in 2007, and an AICUZ update was completed in 2010. The noise contour envelope (defined by the area exposed to 65 dB DNL and above) in the original AICUZ study was larger than the current noise contour envelope created by C-17 and KC-135 operations (Altus AFB 2009c).

The estimated current off-base area affected by noise levels of 65 dB DNL and greater is 4,574 acres (see Section 3.1.1.1). Residential properties currently affected by incompatible noise levels above 65 dB DNL are located in the vicinity of U.S. Highway 62 and N2100 Road, and to the north of the airfield. The residential density in these areas is low (averaging less than one dwelling per acre). Also, a few commercial structures were identified in the original AICUZ study within the APZs. The base has acquired avigation easements and waivers for several properties around the airfield to limit potential future development and incompatible development by other parties.

A JLUS was completed in 1999 to provide further assistance with defining appropriate strategies for community planning around the base. The JLUS identified low-density residential development in the northern APZ II and the southern APZ I as incompatible. This effort was bolstered when the State of Oklahoma passed legislation governing how localities adopt zoning and subdivision regulations that would protect military facilities from encroachment. Since then, the city's planning commission and the Jackson County zoning board have joined the Metropolitan Area Planning Council in regulating land use, structure height, and development density around the airfield (Altus AFB 2009c). In 2005, the City of Altus adopted a Comprehensive Plan that is the basis for land use controls in the city's Unified Development Code. Under the Unified Development Code, proposals are assessed with respect to noise compatibility, accident potential (safety), and height of structures (that could obstruct air navigation) for an area within 3 miles of the city limits. In 2004, Jackson County Ordinance 2004-01 adopted the 1999 JLUS (Alternative 1) as the basis for compatible use zoning for areas surrounding Altus AFB. These zones limit density in areas exposed to noise levels of 65 dB DNL and greater, and recommend sound attenuation construction for new buildings. The ordinance also provided for nonconforming uses to continue without alteration (Altus AFB 2009c).

3.1.7.3 Auxiliary Airfields

As part of the KC-46A FTU training requirements, instructors and student pilots would continue to utilize the same four auxiliary airfields currently used by the KC-135, as described in Section 2.4.1.2.4. No construction or other ground disturbance is proposed at these locations, and noise is not projected to substantially increase as a result of the proposed KC-46A operations. As described in Section 4.1.7.1.3, based on preliminary screening of current and proposed operations at these airfields, only Clinton-Sherman Industrial Airpark (CSM) is carried forward for evaluation for the KC-46A FTU scenario at Altus AFB.

Aircrews from Altus AFB have historically used CSM as an auxiliary airfield to perform pattern work on a regular basis. In 2011, a letter of agreement between Altus AFB and the Oklahoma Spaceport allowed for the continued use of specific facilities at CSM, specifically a fire station with a small cadre of personnel (OSIDA 2011). Current airfield operations at CSM are described in Section 2.4.1.2.4. The small community of Burns Flat is adjacent to CSM. The surrounding land, within Washita County, is rural and sparsely populated and is predominantly used for agriculture.

3.1.8 Infrastructure

3.1.8.1 Potable Water System

Potable water is provided to Altus AFB by the City of Altus. The Tom Steed Reservoir is the primary water source for the City of Altus, with the Altus Reservoir as an emergency water source. Both groundwater and the Quartz Mountain Reservoir act as additional supply sources to the base. Water supply and capacity are reported to be sufficient to meet current mission requirements. The

City of Altus has a contract with Altus AFB to provide a maximum of 1.03 million gallons per day (MGD) of potable water. The Altus AFB water system has the capacity to accommodate 2 MGD. The average water use for 2012 at Altus AFB was 0.3 MGD (USAF 2013a). This is approximately 30 percent of the provider's contracted available water supply. Peak water use at Altus AFB occurs during the summer months; in summer 2012, water demand increased to 0.52 MGD, or 51 percent of the contracted water supply. The water distribution system is in fair condition and is still mission capable, but will require moderate repair, upgrade, or new system components to maintain future sustainment (Altus AFB 2003).

3.1.8.2 Wastewater

The sanitary sewer system at Altus AFB consists of a collection system only. All wastewater is discharged to the City of Altus Wastewater Treatment Plant (WWTP) under the City of Altus Industrial Pretreatment Wastewater Discharge Permit. The City of Altus WWTP has a daily treatment capacity of 4 MGD. WWTP capacity and discharge amounts are reported to be sufficient.

The Altus AFB average wastewater discharge in 2012 was approximately 0.15 MGD, or 4 percent of the city's daily treatment capacity (USAF 2013a). The reported peak wastewater discharge in 2012 was 0.23 MGD, or 6 percent of the capacity. The wastes generated at the industrial facilities on base are of the type that can be discharged into the sanitary sewer system. Most of the sanitary sewer system at Altus AFB is over 45 years old and constructed of vitrified clay pipe or concrete. Of the sanitary sewer lines field surveyed in 2004 and 2007, approximately 85 percent were found to have structural defects; 70 percent (by length) have shallow sags; approximately 35 percent have moderate to severe sags; and 7 percent have significant debris and obstructions (USAF 2011a). About 3,000 linear feet of the system have been upgraded to polyvinyl chloride (PVC). The base has completed additional improvements to the wastewater infrastructure over the past decade to improve performance of the system.

3.1.8.3 Stormwater System

There are approximately 741 acres of impervious cover on Altus AFB (Altus AFB 2009c). Base stormwater drainage infrastructure consists of a network of drainage pipes feeding into open earthen ditches. With the exception of flood-prone areas in the northeast and southwest corners of the base, the stormwater system is reported to perform adequately (Altus AFB 2009c). Altus AFB currently maintains a Storm Water Pollution Prevention Plan (SWPPP) permit with the ODEQ. This SWPPP permit also incorporates requirements of the base NPDES permit, as described in Section 3.1.4.2.1. The permit does not, however, authorize stormwater discharges associated with construction activities. A separate Notice of Intent and SWPPP must be filed with ODEQ for all new construction activities that disturb 1 or more acre.

3.1.8.4 Electrical System

Western Farmers Electric Cooperative supplies and regulates electrical service to Altus AFB from a 69-kilovolt transmission line that enters the base on the south side. Capacity, supply and system capability are reported to be sufficient for current mission requirements. The electricity provider has the capacity to provide 1,054 megawatt hours (MWH) per day (Altus AFB 2009c). The average electric use in 2012 was 125 MWH per day (USAF 2013a). Peak electric demand occurs during the summer months and averaged 153 MWH per day in the summer of 2012. Altus AFB has utilized approximately 12 percent of the electricity provider's average daily generation capacity and 15 percent during peak periods.

3.1.8.5 Natural Gas System

Natural gas is supplied by CenterPoint Energy. Capacity and supply are reported to be sufficient for current mission requirements. The base natural gas system has a design capacity to provide 3,216 thousand cubic feet (Mcf) per day (Altus AFB 2009c). The average natural gas use in 2012 at Altus AFB was 287 Mcf per day (USAF 2013a). Peak natural gas use at Altus AFB occurred during the winter months in 2012, when daily use increased to 736 Mcf. Altus AFB used approximately 9 percent of the provider's average daily capacity and 23 percent at peak use. The distribution system, including distribution lines, mains, and service lines, is considered to be in good to fair condition and may require future upgrades and system components for future sustainment. The main lines within the Capehart and Great Plains Family Housing areas are considered to be in excellent condition (Altus AFB 2009c).

3.1.8.6 Solid Waste Management

All municipal solid waste and construction and demolition (C&D) waste generated at Altus AFB is collected and transported off base by a local qualified contractor. This waste is currently disposed of at the City of Altus Landfill. With a disposal area of approximately 420 acres, the landfill accepts approximately 36,104 tons of solid waste annually, including C&D waste (Altus AFB 2009c). The total capacity of the landfill is approximately 2 million tons. As of 2007, the landfill has utilized 25 acres of the 420 acres of available land. Altus AFB disposed of approximately 594 tons of solid waste in the City of Altus Landfill in 2008, representing approximately 2 percent of the overall solid waste handled by the landfill (Altus AFB 2009c). Altus AFB also has a very active recycling program. Between 2011 and 2012, approximately 620 tons of goods and materials were recycled (Altus Recycling Center Fiscal Year 11, 12).

3.1.8.7 Transportation

Regional access to Altus AFB is provided from the north and south by U.S. Highway 283 (U.S. 283) and from the east and west by U.S. 62. The nearest interstate highways are Interstate 40 (I-40), which extends east-west, approximately 55 miles to the north, and I-44, which extends north-south, approximately 55 miles to the east. Figure 2-2 displays the primary routes and regional transportation network in the vicinity of Altus AFB. U.S. 283 is a two-lane highway that crosses the Oklahoma-Texas border in Jackson County at the Red River.

Access to Altus AFB is provided by Falcon Road, which accesses the Main Gate from the west, and by Challenger Road, via U.S. 62, which provides access to the South Gate. In 2011, Falcon Road had an average daily traffic count of 9,338 vehicles, and U.S. 62 just east of Challenger Road had an average daily traffic count of 5,900 vehicles (OK DOT 2012a). Veterans Drive from Tamarack Road and North Veterans Drive from U.S. 62 are major arterials to Falcon Road and the Main Gate.

The Stillwater Center Railroad connects to the base, but Altus AFB does not currently employ an active rail connection as part of the DoD's Strategic Rail Corridor Network (STRACNET). Altus AFB could reconnect to the STRACNET should the need occur (OK DOT 2012b). The nearest passenger rail line to Altus AFB is an Amtrak station in Purcell, approximately 130 miles to the east. The nearest passenger bus stations are a Greyhound stop in Lawton, approximately 56 miles to the east, and Elk City, approximately 57 miles to the north. Southwest Transit provides public transportation on a demand response basis, with local routes in Altus (including a stop on Altus AFB) and regional service to Lawton, Elk City, Mangum, Hollis, Granite, and Eldorado (OK DOT 2013). Commercial airline service is available at the Lawton-Ft. Sill Regional Airport, approximately 60 miles east of Altus AFB, with service to Dallas-Fort Worth.

The Will Rogers World Airport in Oklahoma City, with five major airlines, is approximately 130 miles northeast of Altus AFB.

3.1.8.7.1 Gate Access

Access to Altus AFB is controlled through three gates. The Main Gate is located on the west side of the base at the end of Falcon Road and is used by base personnel and visitors. The Main Gate is open 24 hours a day, seven days a week and has two inbound and two outbound lanes, each reduced to one by a chicane. The peak period occurs during the morning (6:30 A.M. to 7:30 A.M.), and traffic often backs up to the signal at Veterans Drive and Falcon Road. The Jasmine Gate (North Gate) is located on North Veterans Drive south of the intersection with East Tamarack Road and serves the family housing area. The Jasmine Gate is open Monday through Friday. Queuing is minimal, and the morning peak hour inbound traffic count is the lowest of the three gates. The South Gate is located next to the industrial and fuel storage areas and is accessible from U.S. 62 and Challenger Boulevard (Altus AFB 2010b). The South Gate is used infrequently primarily by fuel supply trucks and trucks carrying explosives (Altus AFB 2003).

3.1.8.7.2 On-Base Traffic Circulation

There are no on-base traffic circulation issues, and the road network is sufficient to accommodate the existing missions. Primary roads within Altus AFB include Falcon Road, First Street, Ordnance Road, Sixth Street, Seventh Street, Alert Access Road, Fir Avenue, Birch Drive, West River Drive, and Great Plains Avenue. Secondary roads include L Avenue, Fifth Street, E Avenue, F Avenue, B Avenue, Sixth Street, Dogwood Avenue, and East River Drive (Altus AFB 2003).

Recommendations for improvement include reconfiguring intersections to allow for a safer and more efficient traffic flow throughout the base, as well as identifying street hierarchy through the use of landscaping, paving and curbing details, widening or lighting, and signage fixtures.

3.1.9 Hazardous Materials and Waste

3.1.9.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Altus AFB are managed in accordance with the Hazardous Materials Management Plan (HMMP) and controlled through a USAF Pollution Prevention (P2) process called Hazardous Materials Pharmacy (HAZMART) (Altus AFB 2007). The HMMP serves as the governing policy for how base maintenance shops acquire, track, and dispose of hazardous materials, along with preventing, preparing for, and responding to the potential small-scale release of hazardous materials.

As part of the overall P2 program at Altus AFB, the HAZMART provides centralized management of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials (Altus AFB 2012b). The purpose of the P2 program is to minimize the use of hazardous and toxic substances and the generation of wastes through source reduction and environmentally sound recycling. The HAZMART process includes review and approval of hazardous material use by USAF personnel to ensure users are aware of exposure and safety risks and to identify potential green alternatives. Pollution prevention measures minimize chemical exposure to employees, reduce potential environmental impacts, and reduce costs for material purchasing and waste disposal.

3.1.9.1.1 Aboveground and Underground Storage Tanks

Bulk JP-8 fuel is stored in eight aboveground storage tanks (ASTs) at five fuel stand areas at Altus AFB. The bulk storage capacity of the eight ASTs is 3,562,910 gallons. Fuel consumption

over the past 3 years has been 43,695,660 gallons in 2010; 44,061,677 gallons in 2011; and 42,518,874 gallons in 2012 (Mackey 2013). There are no underground storage tanks (USTs) on Altus AFB (Staton 2013). There are two Type III hydrant systems rated at 2,400 gallons per minute (GPM) each. The "South Ramp" hydrant system services 14 parking spots dedicated to C-17s, which can be reconfigured for another 6 spots. The "North Ramp" hydrant system services 18 parking spots dedicated to KC-135s.

3.1.9.1.2 Toxic Substances

Toxic substances, as regulated under the Toxic Substances Control Act (TSCA), include asbestos, lead, and polychlorinated biphenyls (PCBs). For the purposes of this Final EIS, these are evaluated in their common forms found in buildings as asbestos-containing materials (ACMs), as lead-based paint (LBP), and in transformers or other mechanical devices as PCBs.

The Asbestos Management Plan provides guidance for the identification of ACMs and the management of asbestos (Altus AFB 2010c). An asbestos facility register is maintained by the Civil Engineering (CE) squadron. The design of building alteration projects and requests for self-help projects are reviewed to determine if ACMs are present in the proposed work area. For any project on base, ACM wastes are removed by the contractor and disposed of in accordance with state and Federal regulations at a permitted off-base landfill.

The LBP Management Plan provides guidance for the identification and management of lead-containing materials (Altus AFB 2011a). An LBP facility register is maintained by CE. The design of building alteration projects and requests for self-help projects are reviewed to determine if lead-containing materials are present in the proposed work area. For any project on base, LBP wastes are removed by the contractor and disposed of in accordance with state and Federal regulations at a permitted off-base landfill.

Electrical transformers at Altus AFB reportedly do not contain PCBs (Wallace 2013b).

3.1.9.2 Hazardous Waste Management

Altus AFB is classified as a large-quantity generator (LQG) (Altus AFB 2007). Aircraft maintenance activities account for approximately 90 percent of all wastes generated (Altus AFB 2010a). Maintenance-generated waste include solvents, paint, paint thinners and strippers, wastewater contaminated with solvents and heavy metals, and waste oils. Hazardous wastes generated during operations activities include cleaners, paint wastes, hydraulic fluids, lubricants, aerosols, and sealants/adhesives.

Hazardous wastes are managed in accordance with the Hazardous Waste/Recovery Waste Management Plan (Altus AFB 2007). In 2012, 17,420 pounds of hazardous wastes were removed from Altus AFB and disposed of in off-base permitted disposal facilities (Laney 2013).

Altus AFB manages spills and releases through the implementation of its Integrated Contingency Plan (ICP), which fills the requirement for a Facility Response Plan (FRP), Spill Prevention Control and Countermeasures (SPCC) Plan, and Hazardous Materials Spill Prevention and Response Plan. The ICP addresses on-base storage locations and proper handling procedures of all hazardous materials (including JP-8 used by the aircraft) to minimize potential spills and releases (Altus AFB 2012c). The ICP further outlines activities to be undertaken to minimize the adverse effects of a spill, including notification, containment, decontamination, and cleanup of spilled materials.

3.1.9.3 Environmental Restoration Program

The DoD developed the Environmental Restoration Program (ERP) to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property. Altus AFB has identified 24 ERP sites (Altus AFB 2013). However, 13 of the 24 sites have received No Further Remedial Action Planned status, leaving 11 active ERP sites. There are four Ground Water Monitoring Units (GWMUs) at Altus AFB. The GWMUs are separate contaminant plumes, with each GWMU underlying one or more of the ERP sites.

3.1.10 Socioeconomics

Socioeconomics refers to features or characteristics of the social and economic environment. The main concern for socioeconomic resources is the change in personnel at Altus AFB associated with the KC-46A FTU or MOB 1 scenario that could potentially impact population, employment, earnings, housing, education, and public services. Jackson County, Oklahoma, is the ROI for this analysis.

3.1.10.1 Baseline Conditions

3.1.10.1.1 Population

In 2010, the population of Jackson County totaled 26,446 persons (U.S. Census 2010a). Between 2000 and 2010, the ROI population decreased at an average annual rate of 0.7 percent, with a total decrease of approximately 1,993 persons (U.S. Census 2000a, 2010a). The City of Altus, the most populated city in Jackson County and the county seat, experienced an annual 0.8 percent decline over the 10-year period (U.S. Census 2000b, 2010b). The population in Oklahoma totaled 3,751,351 persons in 2010, and increased at an average annual growth rate of 0.8 percent between 2000 and 2010 (U.S. Census 2000c, 2010c) (see Table 3-7).

Table 3-7. Population for the City of Altus, Jackson County, and Oklahoma

Location	2000	2010	Annual Percent Change (2000–2010)
City of Altus	21,447	19,813	-0.8%
Jackson County	28,439	26,446	-0.7%
Oklahoma	3,450,654	3,751,351	0.8%

Source: U.S. Census 2000a, 2000b, 2000c, 2010a, 2010b, 2010c.

As shown in Table 2-4 and Table 2-7, Altus AFB had a total work force of 3,891. This includes 1,379 full-time military personnel, 362 students, 1,243 DoD civilians, and 907 other base personnel. In addition, there are 1,051 military dependents and family members associated with the full-time military personnel. Approximately 19 part-time Reservists are also located at Altus AFB, but because they are not considered full-time, they were not considered part of the work force for this analysis (Altus AFB 2011b).

3.1.10.1.2 Economic Activity (Employment and Earnings)

In 2011, the most recent data available, employment in Jackson County totaled 14,622 jobs (BEA 2012). The largest employment sectors in Jackson County were government (37.7 percent), followed by retail trade (11 percent) and accommodation and food services (8.4 percent) (BEA 2012). Construction accounted for 3 percent of total employment in the county. In 2012, the unemployment rate in Jackson County was 4.7 percent (BLS 2013a). The county unemployment rate was lower than the state (5.2 percent) and the Nation (8.1 percent) (BLS 2013b). As of April 2013, the monthly unemployment rate (not seasonally adjusted) for Jackson County was estimated at 4.4 percent (BLS 2013c).

Altus AFB is an important contributor to the Jackson County economy through employment of military and civilian personnel and expenditures for goods and services. The total economic impact of the base on the surrounding communities between October 2011 and September 2012 was $350,567,997 (Altus AFB 2012d). The payroll for military, DoD civilians, and other base personnel was $205,610,457. An estimated $68,875,325 worth of military construction (MILCON) also occurred on base in 2012 (Altus AFB 2012d).

3.1.10.1.3 Housing

Table 3-8 presents census-derived housing data for the City of Altus and Jackson County. In 2010, Jackson County had 12,077 total housing units, of which 15 percent (1,830 units) were vacant (U.S. Census 2010a). The majority of available housing was located in the City of Altus with 8,890 housing units, of which 14 percent of the units (1,263) were vacant at the time of the 2010 Census (U.S. Census 2010b). Of the vacant housing units in the city and county, approximately one-third were available for rent.

Table 3-8. Housing Data for the City of Altus and Jackson County

Location	Housing Units	Occupied	Vacant	For Rent
City of Altus	8,890	7,627	1,263	493
Jackson County	12,077	10,247	1,830	573

Source: U.S. Census 2010a, 2010b, 2010c.

There are three housing options available at Altus AFB: privatized housing, unaccompanied housing, and housing in the local community. Military family housing at Altus AFB is privatized and owned by Balfour Beatty Communities. There are five neighborhoods with a total of 530 single-family homes, of which 517 are occupied, for an occupancy rate of 97.5 percent (Karibian 2013).

Dormitories and Visiting Quarters are available at Altus AFB. There are currently 58 dormitory rooms (116 beds) located in Buildings 81 and 83 on loan from Lodging for non-prior service students (USAF 2013b). There are also two dormitory buildings for permanent-party unaccompanied Airmen, located in Dorm B-331 and Dorm B-333, with a total of 204 rooms. Dorm B-333 is currently undergoing renovations; therefore, permanent-party unaccompanied Airmen are temporarily housed in Dorm B-213 (USAF 2013i). All non-prior service students will be housed in Dorm B-213, which has 96 rooms (192 beds). After renovation of Dorm B-333 has been completed, permanent-party students will relocate from Dorm B-213 to Dorm B-333. The Visiting Quarters lodging requirement is 220 rooms. Currently, 176 personnel are assigned to rooms on base and 44 personnel are residing off base (USAF 2013b). A MILCON project to construct a new 120-room facility is programmed for FY 2017 according to the base's Dormitory Master Plan.

3.1.10.1.4 Education

There are six school districts in Jackson County, which include ten elementary schools, two junior high schools, six high schools, and one intermediate school. The Altus School District has five elementary schools, an intermediate school, a junior high school, and a learning center (Altus Public Schools 2012). The total enrollment in Altus Schools during the 2011–2012 school year was approximately 3,851 students, with a student-to-teacher ratio of 12.7:1 (Altus Public Schools 2013). The student-to-teacher ratio is below the Oklahoma State Department of Education's guidelines, which state grades kindergarten through sixth grade should not be assigned to a teacher or class with more than 20 students (Oklahoma State DOE 2013). Middle

school teachers are limited to instruction of no more than 140 students on any 6-hour school day (Oklahoma State DOE 2013).

There is one elementary school and a youth center on Altus AFB. The L. Mendel Rivers Elementary School is for children in pre-kindergarten through fourth grade and is part of the Altus School District.

3.1.10.1.5 Public Services

Public services in Jackson County include law enforcement, fire protection, emergency medical services, and medical services. The Jackson County Sheriff's Office is responsible for coordinating law enforcement activities within the unincorporated areas of the county. Jackson County hosts an enhanced 911 dispatch center (City of Altus 2013). The Altus Fire/Rescue Department is a professional fire-rescue service in the City of Altus and provides service throughout Jackson County with mutual-aid agreements with Altus AFB and the surrounding rural volunteer and small community departments (City of Altus 2013). The Altus Fire/Rescue Department is spread over two fire stations located in Altus. Jackson County Memorial Hospital in Altus, Oklahoma, is a licensed 99-bed facility in southwest Oklahoma. The hospital is located approximately 4 miles from Altus AFB.

3.1.10.1.6 Base Services

The 97th Medical Group ensures maximum wartime readiness and combat capability by promoting the health, safety, and morale of active-duty personnel. The medical staff trains, mobilizes, and provides medical services in support of contingency operations worldwide. The 97th Medical Group maintains environmental safety and delivers public health services and provides family practice, flight medicine, obstetrics, behavioral health, pediatric, dental, and optometry clinics on base.

Other base services include a child development center (CDC), a dining facility, a fitness center, and Visiting Quarters. The CDC has a capacity of 215 children and is currently operating at approximately 45 percent capacity (USAF 2013b). The dining facility has a total seating capacity of 297. The facility is capable of serving 180 personnel three times every half-hour during the lunch meal. The existing base population utilizes 20 percent of the facility's serving capacity. The fitness center is currently undersized by more than 20,000 square feet for the existing base population (USAF 2013b).

3.1.11 Environmental Justice and the Protection of Children

Concern that certain disadvantaged communities may bear a disproportionate share of adverse health and environmental effects compared to the general population led to the enactment in 1994 of Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO directs Federal agencies to address disproportionate environmental and human health effects in minority and low-income communities, and Title 32 of the *Code of Federal Regulations* (CFR), Part 989, *Environmental Impact Analysis Process*, addresses the need for consideration of environmental justice issues in compliance with NEPA. EO 12898 applies to Federal agencies that conduct activities that could substantially affect human health or the environment. The evaluation of environmental justice is designed as follows:

- To focus attention of Federal agencies on the human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice
- To foster non-discrimination in Federal programs that may substantially affect human health or the environment
- To give minority communities and low-income communities greater opportunities for public participation in, and access to, public information on matters relating to human health and the environment

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was enacted in 1997. EO 13045 directs Federal agencies to identify and assess environmental health and safety risks to children, coordinate research priorities on children's health, and ensure that their standards take into account special risks to children. Children are more sensitive than the adult population to certain environmental effects, such as airborne asbestos and lead paint exposures from demolition, safety with regard to equipment, accidents within structures under demolition, and noise. Activities occurring near areas that tend to have a higher concentration of children than the typical residential area during any given time, such as schools, churches, and community child care facilities, may further intensify potential impacts on children.

Jackson County, Oklahoma, represents the region of comparison for evaluating disproportionate effects (in Chapter 4) on populations of concern for environmental justice and for children. Table 3-9 shows that minorities, low-income populations, and children compose slightly higher proportions of the county population than are found in the State of Oklahoma as a whole.

Table 3-9. Characterization of Environmental Justice Populations for Altus AFB

Location	Total Population	Minority		Low-Income[a]	Youth	
		Number	Percent	Percent	Number	Percent
Jackson County	26,446	9,043	34.19%	18.90%	6,907	26.12%
Oklahoma	3,751,351	1,175,970	31.35%	16.30%	929,666	24.78%
United States	308,745,538	111,927,986	36.25%	14.30%	74,181,467	24.03%

[a] 2007–2011 estimate; all other values based on 2010 census.
Source: U.S. Census 2010a, 2010c, 2012.

3.2 FAIRCHILD AIR FORCE BASE

This section of Chapter 3 describes the baseline conditions of the environmental resources anticipated to be affected by implementation of the KC-46A MOB 1 scenario at Fairchild AFB and, when applicable, in areas surrounding the base. The baseline resource conditions are described to the level of detail necessary to support analysis of the potential impacts that could result from implementation of the KC-46A MOB 1 scenario at Fairchild AFB.

3.2.1 Noise

Noise, which is defined as unwanted sound, has the potential to affect several resource areas evaluated in this Final EIS. Background information on the regulatory setting and methodology for noise is contained in Volume II, Appendix B, Sections B.1.2 and B.1.3.

3.2.1.1 Base-Affected Environment

The current mission at Fairchild AFB is described in Section 2.4.2 and includes KC-135 and H-1 and H-60 (helicopter) aircraft operations. Table 3-10 shows noise levels of the aircraft currently based at Fairchild AFB at different heights above the ground during landings and takeoffs. Aircraft flying at higher altitudes may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly lower noise levels than shown in Table 3-10. Helicopters rarely fly above 2,000 feet AGL. However, noise levels at higher altitudes are given for comparison with other aircraft types. The noise levels in this table are presented as SELs in dB, which are the sum of sound energy during the noise event.

Table 3-10. Aircraft Noise Levels at Fairchild AFB

Aircraft	Power Setting	SEL at Overflight Distance (in dB)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
KC-135	65% NF	100	95	90	84	75	67
H-1 (helicopter)	80 kts	104	100	96	91	83	75
H-60 (helicopter)	80 kts	90	86	83	79	72	66
Takeoff							
KC-135	90% NF	105	100	95	90	81	73
H-1 (helicopter)	80 kts	104	100	96	91	83	75
H-60 (helicopter)	80 kts	90	86	83	79	72	66

Note: KC-135 aircraft airspeed is 160 knots. Aircraft operate at various airspeeds in and around the airfield.
Key: Power Units: NF – engine fan revolutions per minute; kts – knots airspeed
Source: NOISEMAP 7.2 Maximum Omega 10 Results for KC-135 and RNM for H-1 and H-60.

There are 30,507 annual aircraft operations under baseline conditions at Fairchild AFB. Of these operations, 6 percent occur during the night between 10:00 P.M. and 7:00 A.M. Due to the potential for nighttime noise to be particularly intrusive, noise events occurring during this time period are assessed a 10 dB penalty when calculating DNL.

The baseline noise contours shown on Figure 3-2 show the current level of operations at Fairchild AFB and were created using NOISEMAP (Version 7.2). As a point of reference, Figure 3-2 also shows the 65 dB DNL noise contours published in the 2007 AICUZ report (USAF 2007a). Operations tempo at military bases fluctuates over time due to unit deployments, funding levels, and other factors. The AICUZ report noise contours reflect units flying at a

higher home-station operations tempo than was reported in April 2012, re-validated in February 2013, and used as the basis for the baseline noise contours shown on Figure 3-2. Baseline noise contours also differ from contours published in the 2007 AICUZ report as a result of refinements to noise modeling algorithms to account for the effects of local terrain (e.g., hills and valleys) and ground impedance (e.g., grass absorbs sound energy to a greater degree than water). Use of location-specific topographic effect modeling algorithms in NOISEMAP was not approved by the USAF for use in the 2007 AICUZ report. As can be seen on Figure 3-2, calculated noise levels have decreased since release of the 2007 AICUZ report. However, the AICUZ report is a long-term planning tool and remains relevant as an indicator of potential future noise levels if flying operations were to increase.

Table 3-11 shows the number of on- and off-base acres and estimated residents that are currently exposed to noise levels greater than 65 dB DNL. It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed, and this has been accepted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.2.7 and Volume II, Appendix C, Section C.1.3.1). Per DoD policy, the 80 dB DNL noise contour is used to identify populations most at risk of potential hearing loss (USD 2009). If no residence or populated area is within the 80 dB DNL contour, then no further risk assessment is warranted. Noise levels greater than 80 dB DNL do not affect any off-base land outside of Fairchild AFB. On base, there is 1 building in the flightline area affected by noise levels of 80 dB or greater. No residences on base are affected by noise at or above 80 dB DNL. The risk of hearing loss among workers at Fairchild AFB is managed according to DoD, OSHA, and NIOSH regulations for occupational noise exposure. These regulations would continue to be enforced to protect employees of Fairchild AFB.

Table 3-11. Population and Acreage Affected Under Noise Contours Near Fairchild AFB, Baseline Conditions

Noise Level (dB DNL)	Baseline Conditions		
	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	15	162	621
70–74	0	0	523
75–79	0	0	363
80–84	0	0	139
≥85	0	0	26
Total	**15**	**162**	**1,672**

Note: Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Table 3-12 presents noise conditions at several representative locations in the area near Fairchild AFB. Figure 3-2 depicts the representative locations in the vicinity of the airfield. The representative locations do not denote a specific noise-sensitive receptor, but were instead established based on central points of U.S. Census subdivisions. The areas in the vicinity of the noise-sensitive locations are expected to experience similar aircraft noise levels. All of the locations studied experience noise levels less than 65 dB DNL. Departures of transient aircraft (e.g., EA-6B and F-18) and the based H-1 helicopter are the operations that generate the highest SELs at the locations analyzed. Table C-1-2 in Volume II, Appendix C, Attachment C-1, provides details regarding the types of operations generating the highest SELs at each location.

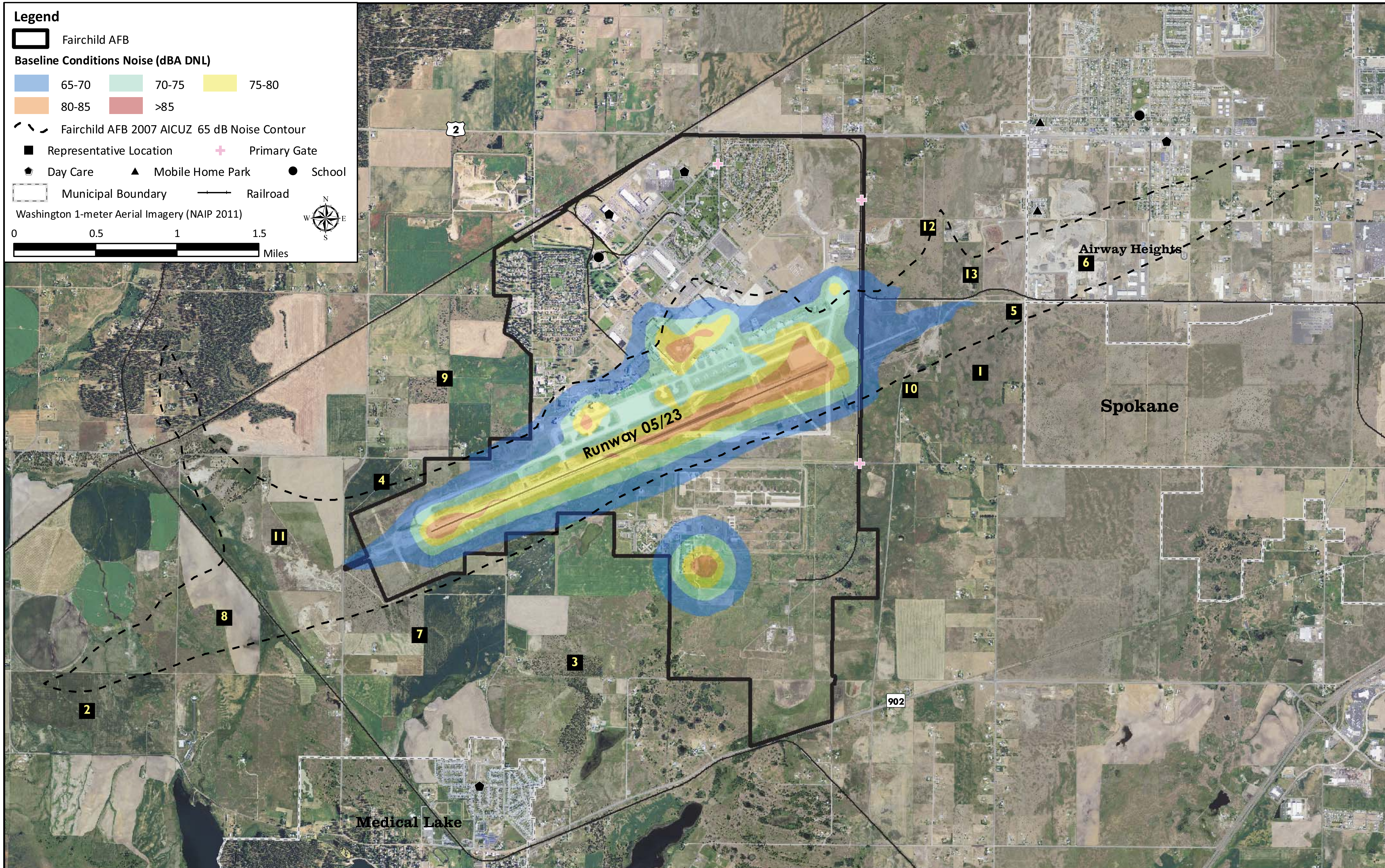

Figure 3-2. Fairchild AFB Baseline Noise Contours

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Table 3-12. Fairchild AFB Representative Locations Under Baseline Conditions

Location ID	Baseline Conditions	
	DNL (dB)	Top 5 SELs (dB)[a]
1	55	98–114
2	56	95–113
3	59	103–111
4	61	103–116
5	60	104–116
6	61	104–112
7	56	96–112
8	62	102–116
9	57	100–110
10	60	105–116
11	59	98–115
12	61	103–113
13	62	105–117

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Volume II, Appendix C, Attachment C-1).

In accordance with AFI 13-201, base flying procedures have been designed to minimize impacts on the surrounding community while maximizing operational capacity and flexibility. Overflight restrictions are in place to minimize noise in sensitive areas. Overflights are not permitted over Eastern Washington State Hospital, Sunset Elementary School, or housing areas on the base. Overflights are not permitted below 1,000 feet AGL over Airway Heights Correctional Facility. Overflights over the City of Spokane are not permitted below 5,000 feet MSL for aircraft or below 500 feet AGL for helicopters. Noise complaints in the community around Fairchild AFB are relatively infrequent. Complaints range from general noise complaints to complaints of low-flying aircraft and noise from exploding ordnance. The explosive ordnance disposal (EOD) training area is located in close proximity to a residential area near the south side of the base that is often affected by explosive noise. A process has been put in place to notify the citizens near the EOD training area before training occurs.

3.2.2 Air Quality

Air emissions resulting from implementation of the KC-46A MOB 1 scenario at Fairchild AFB mainly would affect air quality within Spokane County. The Washington Department of Ecology uses the NAAQS to regulate air quality and establishes state standards with concentrations that are at least as restrictive as the NAAQS. Additional background information on the CAA, the NAAQS, and the Washington Ambient Air Quality Standards (WAAQS) is contained in Volume II, Appendix B, Section B.2. Information on regional climate is contained in Volume II, Appendix D, Section D.2.

The Washington Department of Ecology enforces the NAAQS and WAAQS by monitoring state-wide air quality and developing rules to regulate and permit stationary sources of air emissions. The Washington Air Quality Rules are found in *Washington Administrative Code* Chapters 173-400 through -495. Within Spokane County, the Spokane Regional Clean Air Agency (SRCAA) is the local agency that administers Federal, state, and local air pollution regulations. Fairchild AFB registered 28 stationary sources with the SRCAA in 2012.

3.2.2.1 Region of Influence and Existing Air Quality

Spokane County currently attains the NAAQS and WAAQS for all pollutants. The urban areas of Spokane historically did not attain the NAAQS for CO and PM_{10}. However, they have recently attained these standards and are known as maintenance areas for these pollutants. Fairchild AFB is located approximately 4 miles west of these maintenance areas.

3.2.2.2 Regional Air Emissions

Table 3-13 summarizes estimates of the annual emissions generated by Spokane County in CY 2008 (USEPA 2013a). The majority of emissions within the region occur from (1) on-road and nonroad mobile sources (VOCs, CO, and NO_x), (2) solvent/surface coating usages (VOCs), and (3) residential wood burning and fugitive dust from unpaved roads and agricultural tillage (PM_{10}/$PM_{2.5}$).

Table 3-13. Annual Emissions for Spokane County, Washington, CY 2008

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Stationary Sources	26,462	11,951	1,908	164	14,911	3,159	19,492
Mobile Sources	7,098	79,942	14,467	140	878	731	2,496,165
Total	**33,560**	**91,893**	**16,375**	**304**	**15,789**	**3,890**	**2,515,657**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons
Source: USEPA 2013a.

3.2.2.3 Fairchild AFB Emissions

Operational emissions due to existing operations at Fairchild AFB occur from (1) aircraft operations and engine maintenance/testing, (2) AGE, (3) GMVs and POVs, (4) offsite POV commutes, (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and area sources. Table 3-14 summarizes the most recent estimate of annual operational emissions that occurred at Fairchild AFB (CY 2012). Emission factors used to calculate combustive emissions for the KC-135 aircraft were based on emissions data developed by CFM International for the CFM56-2B1 engine (ICAO 2013a).These data also are used to estimate non-aircraft source emissions for the future project scenarios at Fairchild AFB. Volume II, Appendix D, Section D.2, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from existing sources at Fairchild AFB.

Table 3-14. Annual Emissions from Existing Operations at Fairchild AFB, CY 2012

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-135 Aircraft Operations	5.92	97.27	178.37	16.32	0.89	0.89	45,460
UH-60	0.98	8.68	3.03	0.25	2.02	2.02	2,159
UH-1N	0.16	1.08	0.83	0.07	0.73	0.73	510
Transient Aircraft Operations	4.25	22.46	64.48	5.43	2.44	2.44	14,148
On-Wing Aircraft Engine Testing – KC-135	2.03	29.48	11.25	1.50	0.08	0.08	4,185
On-Wing Aircraft Engine Testing – UH-1M	0.11	0.52	0.06	0.01	0.08	0.08	55
On-Wing Aircraft Engine Testing – UH-60	0.02	0.52	0.16	0.01	0.14	0.14	96
Aerospace Ground Support Equipment	1.24	8.89	10.45	0.30	1.38	1.27	1,268

Table 3-14. Annual Emissions from Existing Operations at Fairchild AFB, CY 2012 (Continued)

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
GMVs/Nonroad Equipment	0.05	0.74	1.01	0.00	0.05	0.04	196
Privately Owned Vehicles – On Base	0.09	3.78	0.90	0.01	0.05	0.03	511
Privately Owned Vehicles – Off Base	2.58	102.75	21.66	0.24	1.81	1.07	13,394
Mobile Fuel Transfer Operations	0.15	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	13.48	10.68	13.07	0.09	0.97	0.97	13,718
Total Emissions	**41.96**	**286.84**	**305.27**	**24.22**	**10.65**	**9.77**	**95,699**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

3.2.3 Safety

The safety resource area applies to activities in the air and on the ground associated with aircraft flight and operation. Flight safety considers the aircraft flight risks, including the potential for bird/wildlife-aircraft strike hazard. Ground safety considers issues associated with operations and maintenance activities that support base operations, including fire response. Background information on the regulatory setting and methodology for safety is contained in Volume II, Appendix B, Sections B.3.2 and B.3.3.

3.2.3.1 Flight Safety

Four Class A KC-135 aircraft mishaps were recorded between 1962 and 1987 in the vicinity of Fairchild AFB. These mishaps resulted in the loss of the aircraft. Another prominent crash involved a B-52 assigned to Fairchild AFB. On 24 June 1994, while rehearsing maneuvers for an air show, the aircraft crashed near the runway (Aviation Safety Network 2013b).

The KC-135 and the future KC-46A have the ability to jettison fuel during emergency situations. Data on historical KC-135 operations show that slightly less than two sorties per thousand resulted in a release of fuel (AMC 2013). The ability to land the KC-46A at a much higher weight than the KC-135 would be expected to reduce the frequency of fuel releases for the KC-46A. As such, it is expected that KC-46A sorties would experience a lower frequency of fuel releases.

It is the policy of the USAF Major Commands (MAJCOMs) to follow AFIs or supplement those AFIs that have been established. These policies require that pilots avoid fuel jettison, unless safety of flight dictates immediate jettison. For example, AMC policy, which covers all USAF tanker assets, requires that, whenever possible, any fuel released from an aircraft must occur above 20,000 feet AGL (AMC 2004, 2012). This policy is designed to minimize potential impacts of fuel jettison events.

The main environmental concern from fuel released from an aircraft is the deposition of fuel onto the ground and/or surface waters and subsequent negative impact on human health or natural resources. The results of a definitive study on the fate of jettisoned fuel from large USAF aircraft (e.g., KC-135) (Deepti 2003) were used to identify a reasonably conservative ground-level fuel deposition value for the KC-46A. This study used the Fuel Jettison Simulation model developed by the USAF to estimate the ground deposition of fuel from jettison events (Teske and Curbishley 2000). This maximum ground-level fuel deposition value identified for the KC-46A would result in effects that are well below known natural resource and human health thresholds

for jet fuel. Therefore, the maximum fuel deposition value expected from the KC-46A would not produce substantial impacts on human health or natural resources. In view of this, no further analysis is included in this section.

3.2.3.1.1 Wildlife Strike Hazard at Fairchild AFB and Vicinity

Most bird strikes at Fairchild AFB occur between May and October. The majority of bird strikes occur in the traffic pattern. Between 2002 and 2007, the 92nd Air Refueling Wing (ARW) experienced an average low of less than one strike in January to more than nine in September.

The 92 ARW BASH Plan provides specific guidance and assigns responsibilities in developing an effective bird strike hazard reduction program for the Fairchild AFB local flying area. This plan also provides guidance to aircrews off-station (USAF 2010a).

The BASH Plan is implemented in two phases. Phase I is concentrated on bird control and dispersal and is in effect year round. Phase II is normally implemented during seasonal migration periods typically May through October (the time of most strikes) and concentrates on bird avoidance using scheduling and airfield operating restrictions. The nearest migration route passes west of Fairchild AFB. Historical bird strike data are used to implement Phase II. In addition to scheduled Phase II months, the 92nd Operations Group implements and terminates Phase II upon notification from Wing Safety that the bird hazard has significantly increased or decreased during the period of implementation of Phase I.

3.2.3.2 Ground Safety

There are currently 18 identified airfield obstructions at Fairchild AFB. USAF policy states that privately owned land located within CZs shall be acquired by the USAF either fee simple or by restrictive land easement. Accordingly, Fairchild AFB has easements for all off-base land within both CZs. Runway 05/23 at Fairchild AFB has CZs encompassing an area 3,000 feet wide by 3,000 feet long. APZ I is 3,000 feet wide by 5,000 feet long and APZ II is 3,000 feet wide by 7,000 feet long.

Agricultural, vacant, and industrial land uses are found within APZ I. While agricultural and vacant land uses are considered compatible, industrial land, depending on the specific use, could be potentially incompatible.

Within the Fairchild AFB APZ II, land use includes residential, commercial, industrial, public, vacant, and agricultural. Residential development might be compatible providing it does not exceed USAF density recommendations of one dwelling unit per acre. To the east of the base, land use designated as residential exists within APZ II and could be considered potentially incompatible depending on the specific use.

The 92nd Civil Engineering Squadron Fire and Emergency Services Flight provides 24-hour crash, structural, and emergency medical first response; technical rescue; hazardous material and weapons-of-mass-destruction incident response; and fire prevention, safety, and training/education services to Fairchild AFB. The department also has a mutual-aid agreement with the Washington State Department of Natural Resources covering Cusick Field (located approximately 75 miles from the base).

As detailed in Section 3.2.7, Spokane County has developed and implemented airport overlay zones (AOZs) to reduce the potential for airport hazards that apply to all four airports in the county, including Fairchild AFB. The AOZ program is similar in design and intent to the DoD's AICUZ program. The AOZ establishes guidelines for development around the four designated airports and has a process for how applications for development are handled.

3.2.4 Soils and Water

3.2.4.1 Soil Resources

Fairchild AFB is located on the channeled scablands of the Columbia Basin, an area defined by physiographic features such as coulees, buttes, mesas, dry waterfalls, hanging valleys, and giant ripples. The area around Fairchild AFB was formed by the lava flows of the Columbia Plateau and shaped by glacial floodwaters that widened the Spokane River Valley and deposited gravel layers up to 500 feet thick (Fairchild AFB 2012a; WDNR 2013). There are nine soil map units located on Fairchild AFB: Alecanyon-Cheney (very stony), Caldwell silt loam, Cheney-Alecanyon complex, Cheney-Uhlig complex, Cocolalla ashy silt loam, Phoebe-Bong complex, Rockly-Deno complex, Saltese muck, and Uhlig ashy silt loam (USDA 2005b). In general, these soils are very deep, well-drained, and moderately permeable, with low surface run-off.

3.2.4.2 Water Resources

3.2.4.2.1 Surface Water

Fairchild AFB is located in proximity to the boundaries of three watersheds: the Lower Spokane, the Hangman, and the Palouse (WDOE 2012); however, it is considered unlikely that typical stormwater discharges from Fairchild AFB would reach water bodies located in any of the watersheds (Fairchild AFB 2008a). There are no defined, natural stream courses on Fairchild AFB. Seasonal run-off disperses across the relatively flat landscape and ponds in natural depression areas before infiltrating, evaporating, or being collected in man-made drains in the developed areas of the base (Fairchild AFB 2012a). The nearest water bodies to Fairchild AFB are the Spokane River, approximately 13 miles to the east, and several lakes (Medical, West Medical, Silver, Clear, Otter, and Granite) just to the south of the base. Surface hydrology on Fairchild AFB can generally be described as isolated from free-flowing surface waters within the watersheds, and surface water features are wetlands with seasonal or persistent ponding and stormwater catchments or conveyances (Fairchild AFB 2012a).

To manage stormwater run-off and to protect the quality of surface water on base and in the vicinity of the base, Fairchild AFB has been issued a permit under USEPA’s 2008 NPDES Multi-Sector General stormwater permit. To ensure that sedimentation due to erosion does not impact local water quality, a permit is required for any construction activities greater than 1 acre (Fairchild AFB 2012a).

3.2.4.2.2 Groundwater

Several regional aquifers are located near Fairchild AFB and are the source of a portion of the base water supply: the Spokane Valley-Rathdrum Prairie Aquifer, the Latah (Hangman) Creek Aquifer, and the West Plains Aquifer. Perched groundwater can occur 5–20 feet below the ground. Shallow aquifers and groundwater movement from 20–100 feet in depth are correlated with bedrock fractures filled with gravel or deep deposits of stratified sands and gravels. Subsurface groundwater trends easterly and southeasterly from the base. Deeper confined aquifers below Fairchild AFB are correlated with basalt layers and with major aquifers at 100–200 feet and 400 feet below ground level (Fairchild AFB 2012a).

Institutional controls associated with ERP sites at Fairchild AFB have been implemented to prevent exposure from contaminated media. These controls include restrictions against the use of contaminated groundwater and restrictions on the use of groundwater as a potable water supply.

3.2.4.2.3 Floodplains

No 100-year floodplains are located on Fairchild AFB.

3.2.5 Biological Resources

3.2.5.1 Vegetation

Shrub-steppe and grasslands grading into ponderosa pine forest historically dominated the land associated with and surrounding Fairchild AFB (Fairchild AFB 2012a). The original vegetation at the base was altered by past farming, grazing, and military development and training that changed or displaced natural systems and ecological processes.

Improved areas of the base consist primarily of landscaped and turf areas surrounding buildings, residences, play areas, and recreation fields. Semi-improved areas consist of mixtures of native and non-native plants that are mowed periodically.

Natural areas are categorized for land use planning purposes as unimproved areas (Fairchild AFB 2012a). Approximately 1,400 acres in the northeast corner and southern portion of the base are unimproved and are dominated by both native and non-native pasture grasses, wetlands species, Russian olive (*Elaeagnus angustifolia*), scattered ponderosa pine stands, and shrub fields.

3.2.5.2 Wildlife

Information on wildlife occurring on Fairchild AFB is contained in the INRMP (Fairchild AFB 2012a). Most of the wildlife species that occur on Fairchild AFB are located in the south base area, where wetland and other habitats are located. Native wildlife documented on the base includes a variety of mammals and birds. White-tailed deer, mule deer (*Odocoileus hemionus*), and coyote are the most common large mammals. Typical bird species include red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), great horned owl (*Bubo virginianus*), ring-necked pheasant (*Phasianus colchicus*), and a variety of waterfowl and songbird species. A recent herpetological survey documented four reptile and three amphibian species in the southern portion of the base (Sperry 2013).

Fairchild AFB is located within the Pacific Flyway, which is a bird migration corridor primarily designated for waterfowl. Large numbers of Canada geese and ducks are known to migrate through this area.

3.2.5.3 Special-Status Species

In Washington State, special-status species are listed by the Washington Fish and Wildlife Commission under the provisions of *Washington Administrative Code* Rule 232-12-297 (Endangered, Threatened, and Sensitive Wildlife Species Classification). Listing occurs in much the same stepwise procedure as occurs at the Federal level. Species can be state-listed as endangered, threatened, or candidate. Table 3-15 presents the Federal and state-listed species identified as either occurring or potentially occurring at Fairchild AFB (USFWS 2013b; WDFW 2013; WDNR 2012). There is no critical habitat known to occur on base (USFWS 2013c).

Of the 18 potentially occurring bird species in Table 3-15, only the bald (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) have been observed on base (Eastern Washington University 2005). Bald eagles are known to nest throughout Washington and migrate through the area encompassing and adjacent to the base. Golden eagle habitat generally consists of open country and open wooded country. No known eagle nests have been observed at the base. The species previously observed are most likely migrating individuals passing through the area.

Table 3-15. Special-Status Species that Could Occur at Fairchild AFB

Common Name	Scientific Name	Status		Occurrence at Fairchild AFB
		Federal[a]	State[b]	
Birds				
American white pelican	*Pelicanus erythrorhynchus*	MBTA	SE	No
Bald eagle	*Haliaeetus leucocephalus*	Delisted, BGEPA	SS	Yes
Black-backed woodpecker	*Picoides arcticus*	MBTA	SC	No
Burrowing owl	*Athene cunicularia*	MBTA	SC	No
Ferruginous hawk	*Buteo regalis*	MBTA	ST	No
Flammulated owl	*Otus flammeolus*	-	SC	No
Golden eagle	*Aquila chrysaetos*	BGEPA	SC	Yes
Lewis' woodpecker	*Melanerpes lewis*	MBTA	SC	No
Loggerhead shrike	*Lanius ludovicianus*	MBTA	SC	No
Merlin	*Falco columbianus*	MBTA	SC	No
Northern goshawk	*Accipitor gentilis*	MBTA	SC	No
Pileated woodpecker	*Drycopus pileatus*	MBTA	SC	No
Sage sparrow	*Amphispiza belli*	MBTA	SC	No
Sage thrasher	*Oreoscoptes montanus*	MBTA	SC	No
Sharp-tailed grouse	*Tympanuchus phasianellus*	-	ST	No
Upland sandpiper	*Bartramia longicauda*	MBTA	SE	No
Vaux's swift	*Chaetura vauxi*	MBTA	SE	No
Western grebe	*Aechmophorous occidentalis*	MBTA	SC	No
Mammals				
Black-tailed jackrabbit	*Lepus californicus*	-	SC	No
Townsend's big-eared bat	*Coryhorhinus townsendii*	-	SC	No
Washington ground squirrel	*Spermophilus washingtoni*	FC	SC	No
White-tailed jackrabbit	*Lepus townsendii*	-	SC	No
Reptiles/Amphibians				
Boreal toad	*Bufo boreas*	-	SC	No
Columbia spotted frog	*Rana luteiventris*	-	SC	Yes
Northern leopard frog	*Rana pipens*	-	SE	No
Invertebrates				
Juniper hairstreak	*Mitoura grynea barryi*	-	SC	No
Mann's mollusk-eating ground beetle	*Scaphinotus mannii*	-	SC	No
Shepherd's parnassian	*Parnassius clodius shepherdi*	-	SC	No
Silver-bordered fritillary	*Boloria selene atrocostalis*	-	SC	No
Plants				
American pillwort	*Pilularia americana*	-	ST	Yes
Austin's knotweed	*Polygonum austiniae*	-	ST	No
Dwarf rush	*Juncus hemiendytus var. hemiandytus*	-		No
Grand redstem	*Ammannia robusta*	-	ST	No
Howellia	*Howellia aquatilis*	FT	ST	No
Inch-high rush	*Juncus uncialis*	-	SS	Yes
Lowland toothcup	*Rotala ramosior*	-	ST	No
Mousetail	*Myosurus laevicaulis*	-	SS	Yes
Northwestern yellowflax	*Sclerolinon digynum*	-	ST	Yes
Palouse goldenweed	*Haplopappus liatriformis*	-	ST	No
Rocky Mountain bulrush	*Scirpus saximontanus*	-	ST	No
Spalding's catchfly	*Silene spaldingi*	FT	ST	Yes
Yellow lady's slipper	*Cypripedium parviflorum*	-	ST	No

[a] U.S. Fish and Wildlife Service
[b] Washington Department of Fish and Wildlife and Washington Department of Natural Resources
Key: BGEPA – protected under the Bald and Golden Eagle Protection Act; FC – candidate for Federal listing; FT – listed as threatened under the Endangered Species Act; MBTA – protected under the Migratory Bird Treaty Act; SC – candidate for state listing; SE – state-listed as endangered; SS – state-listed as sensitive; ST – state-listed as threatened
Source: Fairchild AFB 2012a; USFWS 2013b; WDFW 2013; WDNR 2012.

None of the mammal species listed in Table 3-15 have been observed on Fairchild AFB. There is no significant fish habitat located at the base.

Of the three reptile/amphibian species in Table 3-15, only the Columbia spotted frog (*Rana luteiventris*) has been identified on Fairchild AFB. Populations were located in the wildlife area, in the flightline ditch, at the Munitions Storage Area pond, the EOD range, and the Reserve Training camp area.

Of the 13 plant species in Table 3-15, only 5 have been identified on base: Spalding's catchfly (*Silene spaldingi*), American pillwort (*Pilularia americana*), inch-high rush (*Juncus uncialis*), mousetail (*Myosurus clavicaulis*), and Northwestern yellowflax (*Sclerolinon digynum*) (Fairchild AFB 2012a). All of these species occur in the southern portion of Fairchild AFB, outside of the project area.

3.2.5.4 Wetlands

There are approximately 219 acres of disturbed and semi-natural wetlands on Fairchild AFB (Fairchild AFB 2012a). Wetlands and associated fringe communities occur around potholes and vernal pools in the southern portion of the base. The southeast edge of the main base supports a large wetland complex consisting of Russian olive scrub-shrub habitat and a mosaic of grasses and grass-like plants.

3.2.6 Cultural Resources

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources.

3.2.6.1 Architectural

Fairchild AFB conducted three building inventories (Fairchild AFB 2012b) and determined Building 2245 (Base Personnel/Finance) and the Flight Line Historic District (consisting of 17 individual buildings: 1001, 1003, 1005, 1007, 1009, 1011, 1012, 1013, 1015, 1017, 1019, 1021, 1023, 1024, 1025, 1026, and 2050) are eligible for listing on the NRHP. The Washington SHPO has concurred with this determination. The Washington SHPO [Department of Archeology and Historic Preservation (DAHP)] also considers Building 2025 (Snow Barn) eligible for listing on the NRHP. In November 2012, the 92 ARW Commander, the DAHP, and the Spokane City/County Historic Preservation Office signed a Memorandum of Agreement (MOA) allowing Fairchild AFB to demolish buildings within the Flight Line Historic District if mitigation measures stated in the MOA are completed prior to demolition.

3.2.6.2 Archaeological

Three archaeological surveys have been conducted on Fairchild AFB. Those surveys have resulted in the documentation of three historic archaeological sites (Fairchild AFB 2012b). In 1998, a historic well was discovered and evaluated by the Spokane County Historic Preservation Office; it was not considered eligible for the NRHP (Fairchild AFB 2012b). There are no NRHP-eligible archaeological resources on Fairchild AFB.

3.2.6.3 Traditional

Fairchild AFB has identified four tribes typically consulted with as part of the NEPA and Section 106 processes. This list of tribes is contained in Table A-1 in Volume II, Appendix A, Section A.3. There are no known tribal sacred sites or properties of traditional religious and cultural importance in the vicinity of Fairchild AFB.

3.2.7 Land Use

Fairchild AFB is located in Spokane County, Washington, about 12 miles west of the City of Spokane. Land use immediately surrounding Fairchild AFB is predominantly agricultural and grazing.

3.2.7.1 Base

The base is currently updating its Installation Development Plan (IDP), which includes a long-range development plan and describes physical development on the base, with the layout of functional areas and land uses. About half of the base is dedicated to the airfield (centered around one southwest-northeast runway alignment). Industrial functions, recreational areas, community support functions, open space, and housing areas occupy much of the remainder of the base, on the north side of the airfield. The munitions storage activity and Survival, Evasion, Resistance and Escape (SERE) training complex are located on the south side of the base.

The USAF has restrictive easements on privately and publicly owned land adjacent to Fairchild AFB within the CZs to protect against incompatible uses. Airfield operations and base land use are compatible with adjacent land uses and do not have any notable compatibility issues either internally or outside the boundary. Future development on the base is likely to consolidate and upgrade current functions and not change the existing basic organization of land uses (USAF 2013c).

3.2.7.2 Surrounding Areas

As shown on Figure 3-2, the land bordering Fairchild AFB is not urbanized and consists of large-lot residential uses and resource-based industries, including ranching, farming, and mining operations. The predominant land use within the unincorporated areas surrounding the base is agriculture, with vast areas west and southeast of the base devoted to grain production or maintained as open range land. Very low-density residential development occurs, with minimum lot sizes of 3 to 10 acres on the south, west, and north sides of the base.

The City of Airway Heights is located about 1 mile to the northeast and is bisected by U.S. Highway 2, while the City of Medical Lake is located about 1.5 miles to the south. Spokane International Airport is located to the east in a light industrial area. The City of Airway Heights is composed of a variety of land uses, with industrial areas located closest to the base. Land between Airway Heights and the base boundary is mostly open and is zoned for agriculture and some industrial uses.

The City of Medical Lake contains considerable amounts of residential and public land uses. Most of the residences, commercial uses, schools, and city offices are in the northeastern portion of the city, while the state institutions are to the west and southwest. Medical Lake is not within the Fairchild AFB noise contours. However, land use and development issues within its jurisdiction are important due to the community's proximity to the base. While development around the City of Medical Lake has historically expanded on the north side of the community toward the base, a recent urban growth update limited further northward expansion and provided eastward opportunities instead (Spokane County 2013).

The West Plains Property, located approximately two miles from Fairchild AFB, is owned by the U.S. government and held in trust for the Spokane Tribe of Indians. The 145-acre parcel contains a retail fuel and convenience store and is the site of a planned mixed-use development.

Based on review of the existing noise contours, it is estimated that the off-base area affected by noise levels of 65 dB DNL or greater is 1,672 acres. An evaluation of aerial imagery shows few structures in this footprint outside the base, and no residential-type structures.

Spokane County has experienced steady population growth mostly due to consistent growth in its diverse industrial and commercial economic base. The population of Spokane County has grown 65 percent between 1960 and 2008. Extensive residential, commercial, and industrial uses have grown near the base over the past 15 years as a result of a shift in urban density population and economic activity to semi-rural areas. Population growth of the Spokane area is projected to continue, with the area attracting an estimated 87,000 additional residents by 2030 (State of Washington 2012).

Compatibility planning has been on the forefront for the area around Fairchild AFB since it was built in 1942. The USAF provides land use recommendations and guidelines for compatible use to local jurisdiction through the AICUZ program. Fairchild AFB prepared an AICUZ study for the KC-135 operations in 2005, and updated the study in 2007 (USAF 2007a). This study identified incompatible residential and public use lands within the Northern APZ II.

A JLUS was completed September 2009 by Spokane County to provide further assistance with defining appropriate strategies for community planning around Fairchild AFB. Spokane County has developed and implemented AOZs to reduce the potential for airport hazards at four airports in the county, including Fairchild AFB. This is particularly relevant due to the proximity of Spokane International Airport and its associated air traffic and noise. The AOZ program is similar in design and intent to DoD’s AICUZ program. Zoning in surrounding municipalities of Airway Heights, City of Spokane, and Spokane County is generally compatible with the base’s mission. They have all adopted some level of protection from incompatible development in their zoning regulations to guide compatible development around the base. The Spokane Tribe of Indians also participated in the JLUS process and has coordinated with the USAF on compatible development at the West Plains Property. The Spokane Tribe of Indians enacted the West Plains Development Code to implement the recommendations of the JLUS, including building heights, density, sound attenuation, wildlife attractants, light and glare.

3.2.8 Infrastructure

3.2.8.1 Potable Water System

Potable water is provided to Fairchild AFB by the Fort George Wright Annex, located northeast of Spokane International Airport. The wells tap into groundwater from both the Spokane Valley-Rathdrum Prairie Aquifer and the Latah (Hangman) Creek Aquifer and feed the Geiger Reservoir. There are five pumps at the complex that have a total actual capacity of 4,420 GPM (6.4 MGD). Fairchild AFB has a total of 2.16 million gallons (MG) of water storage capacity (0.51 MG at Geiger Reservoir and 1.65 MG in five tanks on base). If water demand is not met by the Fort George Wright well complex, there are two backup groundwater sources for potable water supply (Well 2 and an intertie with the City of Spokane) that could supply an additional 4.6 MGD (Well 2 – 1 MGD and intertie – 3.6 MGD) of potable water, for a total amount of 11 MGD available to the base. Potable water consumption in 2012 averaged a daily demand of 1.73 MGD and a peak demand of 4.82 MGD (USAF 2013d). This average daily use amounted to 16 percent of base water system capacity (including backup sources) and 44 percent of base capacity (including backup sources) at peak daily demand.

3.2.8.2 Wastewater

The sanitary sewer system is only composed of a collection system (USAF 2010b). The Spokane Wastewater Management Department treats the majority of the wastewater from the base at the Riverside Park Water Reclamation Facility (RPWRF). The only exception is the three mounded drain field systems Fairchild AFB operates and maintains on the south side of the base. The

RPWRF is located on the east bank of the Spokane River, can treat up to 44 MGD, and currently processes 28–30 MGD of sewage, which is approximately 68.2 percent of capacity (Coster 2013). Discharge from the RPWRF into the Spokane River must meet the city’s NPDES permit.

The overall condition of the sanitary sewer system is considered adequate for current mission requirements (USAF 2010b). Recent sanitary surveys of the system have identified a number of inflow and infiltration (I&I) issues that require attention. A series of projects to upgrade the system are underway and will reduce historical levels of I&I by 80 percent. The wastewater collection system at Fairchild AFB has a capacity of 1.8 MGD (USAF 2012a). In 2012, daily discharges from the base averaged 0.68 MGD and peaked in March and April at 1.254 MGD (USAF 2012a). This average daily discharge was approximately 39 percent of the base system capacity and 70 percent at peak daily discharge.

3.2.8.3 Stormwater System

The details of the stormwater drainage system for Fairchild AFB are contained in the SWPPP (Fairchild AFB 2008a). The stormwater conveyance system covers the central portion of the base and flightline. The southern portion of the base drains into a conveyance system serving the SERE School campus. The remainder of the developed area of the base drains via sheet flow into open drainage ditches. The details of the stormwater permit for Fairchild AFB are described in Section 3.2.4.2.1. The permit does not, however, authorize stormwater discharges associated with construction activities. A separate Notice of Intent and SWPPP must be filed for all new construction activities that disturb 1 or more acre.

3.2.8.4 Electrical System

The Bonneville Power Administration, through Avista Utilities, provides electrical service to Fairchild AFB through two substations (north and south). Historic load data from October 2001 to September 2002 show a maximum peak loading of about 10.8 megawatts during the summer. Winter peak loading is slightly lower than summer peak loading. Average daily electric demand for this same period was 180 MWH per day based on annual demand of 65,700 MWH. The north and south substations have the capability to provide redundant power for the entire base with the exception of limited “load shedding” of non-critical mission requirements during peak loading periods. There are projects programmed to increase the size of the north substation and increase electrical conductor sizes at critical points to eliminate load shedding for redundant capability. In 2010, the Fairchild AFB electrical system was rated as “adequate.” In addition, the base has adequate backup power systems to support priority facilities as outlined in the base Contingency Response Plan (USAF 2003a).

3.2.8.5 Natural Gas System

The natural gas system at Fairchild AFB has been privatized and is supplied by Avista Utilities through natural gas lines that are owned by two different contractors, Honeywell and Avista. The natural gas piping that was installed under the Honeywell Energy Saving Performance Contract will be conveyed to Avista Utilities in the near future. The natural gas system is considered adequate to meet current mission requirements (USAF 2012b). The natural gas system does not represent a constraint to the future development on Fairchild AFB.

3.2.8.6 Solid Waste Management

All municipal solid waste and C&D waste generated at Fairchild AFB is collected and transported off base by a local qualified contractor. Depending on the type of solid waste, waste is either taken to the Spokane Regional Waste to Energy Facility or the Graham Road Landfill. With a disposal

area of approximately 300 acres, the landfill accepts approximately 122,000 tons of solid waste annually and has a projected remaining life of 103 years (Waste Management 2013). Fairchild AFB also has a very active recycling program. C&D contractors are required to recycle C&D debris to the maximum extent practicable to ensure that Fairchild AFB meets the DoD goal of a 60 percent C&D diversion rate by 2015. All non-recyclable C&D waste is collected in a dumpster until removal. C&D waste contaminated with hazardous waste, ACM, LBP, or other undesirable components is managed in accordance with AFI 32-7042 and AFI 32-7086 (USAF 2012c).

3.2.8.7 Transportation

Regional access to Fairchild AFB is provided by I-90, U.S. Highway 2 (U.S. 2), and State Highway 902. Figure 2-8 displays the primary routes and regional transportation network in the vicinity of Fairchild AFB. I-90 extends east-west and is located approximately 2 miles from the southern boundary of the base. U.S. 2 extends east-west through the length of Washington State, entering from Idaho to the east and continuing through the state until the City of Everett, near the Puget Sound. At the entry point for Fairchild AFB, U.S. 2 had an average daily traffic volume of 16,000 vehicles per day (WA DOT 2013). At points just to the east and west of the exit for U.S. 2, I-90 has average daily traffic volumes of approximately 67,000 and 36,000 vehicles per day, respectively (WA DOT 2013). Highway 902 follows along Fairchild's southernmost boundary and provides residents of Medical Lake easy access to the Thorpe/Rambo Gate during the morning and evening rush hours.

Though there is not a direct link to Fairchild AFB, Burlington Northern Santa Fe Railway operates a rail line that passes just outside the northwest boundary of the base. Amtrak provides regional passenger rail service by way of the Empire Builder line, with a stop in Spokane. Regional bus service is provided by Greyhound with a stop in Spokane, in proximity to the train station. Spokane Transit Authority provides public transportation within the City of Spokane and includes stops at the Spokane International Airport, the Main Gate at Fairchild AFB, and the base Exchange/Commissary (Spokane Transit Authority 2013). Commercial airline service is available at Spokane International Airport with access to seven national and regional carriers.

3.2.8.7.1 Gate Access

Vehicle access to the base is provided through three primary gates: the Main Gate, Rambo Gate, and Thorpe Gate. The Main Gate is located at the northern end of the base on Mitchell Street just off of U.S. 2 and is open 24 hours daily. The Rambo Gate is located on the east side of the base on South Rambo Road and is only for commercial vehicles and ID card holders (6:00 A.M. to 8:00 A.M. [inbound only] and 4:00 P.M. to 6:00 P.M. [outbound only]). Rambo Gate is manned from 6:00 A.M. to 6:00 P.M. Monday through Friday and is closed on holidays. Thorpe Gate is located on the southeastern part of the base and serves personnel working in the southern part of the base, as well as personnel living in off-base communities, such as the cities of Cheney and Medical Lake. Thorpe Gate is open 6:00 A.M. to 8:00 A.M. (inbound only) and 4:00 P.M to 6:00 P.M. (outbound only) Monday through Friday for ID card holders only. McFarland Gate and Graham Gate are located on the west side of the base but are only used as contingency gates. Welcome Road and Bartholomew Road gates are on unimproved base roads but can provide ingress/egress in an emergency (Fairchild AFB 2010a).

3.2.8.7.2 On-Base Traffic Circulation

The roads on Fairchild AFB meet the base's needs (Fairchild AFB 2010a). The primary arterial roads moving traffic onto and off of the base are Mitchell Drive, Bong Street, and Fairchild Highway. All other roads feed into these two primary roads. The main secondary roads

include Strategic Air Command Boulevard, West Castle Street, Arnold Street, and O'Malley Avenue. Under normal conditions, the roads serving Fairchild AFB adequately handle traffic loads. Two areas that require attention are the Main Gate and the intersection of Poplar Street at Mitchell Drive. The intersection does not flow well during the afternoon peak travel time due to traffic exiting from family housing and traffic departing the base. There is no control device at the intersection, and traffic on Poplar Street must wait for breaks in traffic along Mitchell Drive (USAF 2012b). In 2008, a traffic circulation study was conducted for the base. For the Poplar Street and Mitchell Drive intersection, the study recommended restricting flow to right in/right out only on Poplar Street. As for the Main Gate, there are no calming lanes on the outbound side. Under normal security levels, the gate operates at an acceptable level. However, when threat conditions are raised, jersey barriers are put in a serpentine pattern in the outbound lane to prevent incursion from off-base threats. Traffic backups do occur, filling up the outbound lane. Calming lanes on the outbound side have been identified as a potential solution to alleviate this problem.

3.2.9 Hazardous Materials and Waste

3.2.9.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Fairchild AFB are managed in accordance with HMMP and controlled through three HAZMARTs (Fairchild AFB 2012c) that are part of the Fairchild AFB P2 program. The HMMP serves as the governing policy for how base maintenance shops acquire, track, and dispose of hazardous materials, along with preventing, preparing for, and responding to the potential small-scale release of hazardous materials.

The three HAZMARTs on Fairchild include (1) the primary HAZMART operated under a no-cost contract with Envision, (2) the Government-Operated Civil Engineer Supply Store, and (3) the Medical Group, Medical Logistics Supply. As part of the overall P2 program, the HAZMARTs provide centralized management of the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials (Fairchild AFB 2008b). Proper hazardous materials management will minimize chemical exposure to employees, reduce potential environmental impacts, and reduce costs for material purchasing and waste disposal.

3.2.9.1.1 Aboveground and Underground Storage Tanks

Because the USEPA made a determination, in the form of a letter, that there are no pathways for an oil spill to potentially reach navigable water or other sensitive areas as listed in 40 CFR 112, an SPCC Plan or FRP is not required for Fairchild AFB (USEPA 1997). The Comprehensive Emergency Management Plan (CEMP) addresses roles, responsibilities, and response actions for all major accidents, including major spills (Fairchild AFB 2010b).

Fairchild AFB has seven ASTs with capacities greater than 10,000 gallons. These ASTs are located at the bulk fuel storage area and are used to store Jet-A (with additives) (JAA) and aircraft deicing chemicals. Fairchild AFB also manages 23 USTs. The total JAA storage capacity at Fairchild AFB is approximately 4,600,000 gallons (Fairchild AFB 2008a). Fairchild AFB used approximately 14,900,000 gallons of JAA in 2012. Fairchild AFB receives fuel through a commercial pipeline and commercial tank truck. JAA is delivered to the flightline through two Type III hydrant-refueling systems (Fairchild AFB 2010b).

3.2.9.1.2 Toxic Substances

The Asbestos Management Plan establishes management responsibilities, procedures, and details regarding how the base will carry out ACM-related work (Fairchild AFB 2011a). The elements of any ACM abatement work are survey, notification, personnel training, work practices/control of emissions, disposal, and record keeping. The CE squadron maintains a permanent file documenting asbestos activities. All proposed facility construction, repair, maintenance, demolition, and renovation or self-help projects will be reviewed, to the extent possible, to identify the presence of ACM prior to work beginning. Work on ACM projects will only be performed by individuals with current certificates of training in accordance with OSHA and USEPA standards. The Spokane Regional Clean Air Agency administers the asbestos program in Spokane County (SRCAA 2013a). For any project on base, ACM wastes are removed by the contractor and handled and disposed of in accordance with Federal, state, and local regulations at a waste disposal site authorized to accept such waste.

The Fairchild AFB Lead Exposure and Lead-Based Paint Management Plan is designed to establish management responsibilities and procedures for identifying and controlling hazards related to the presence of LBP (Fairchild AFB 2011b). The plan establishes and describes the organizational roles and responsibilities, program development, management actions, data management, and training. LBP surveys are conducted by contractors prior to any renovation or demolition projects at pre-1980 facilities at Fairchild AFB. The base complies with all Federal, state, and local requirements regarding LBP, LBP activities, and LBP hazards.

A PCB survey was completed at Fairchild AFB; the only remaining PCBs are potentially in fluorescent light ballasts in structures constructed prior to 1979 (Potter 2013).

Based on the results of the Radon Assessment and Mitigation Program of 1987, Fairchild AFB has been determined to be at a medium risk for indoor radon levels and is subject to the applicable requirements outlined in AFI 48-148, Ionizing Radiation Protection.

3.2.9.2 Hazardous Waste Management

Fairchild AFB is classified as an LQG. Typical hazardous wastes generated during operations and maintenance activities include flammable solvents, contaminated fuels and lubricants, paint/coating, stripping chemicals, waste oils, waste paint-related materials, and other miscellaneous wastes.

Hazardous wastes at Fairchild AFB are managed in accordance with the Hazardous Waste Management Plan (Fairchild AFB 2011c). This plan covers the control and management of hazardous wastes from the point the material becomes a hazardous waste to the point of ultimate disposal, as required by Federal and state laws and regulations. In 2012, the base generated approximately 31,000 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities.

3.2.9.3 Environmental Restoration Program

There are 89 ERP sites and two areas of concern at Fairchild AFB that are administered in accordance with the Management Action Plan. The Management Action Plan describes the integrated, coordinated approach of conducting the ERP activities required (Fairchild AFB 2013). Environmental response actions are planned and executed under the ERP in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and other applicable laws. Fairchild AFB was listed on USEPA's National Priorities List in March of 1989.

3.2.10 Socioeconomics

Socioeconomics refers to features or characteristics of the social and economic environment. The main concern for socioeconomic resources is the change in personnel at Fairchild AFB associated with the KC-46A MOB 1 scenario that could potentially impact population, employment, earnings, housing, education, and public services. Spokane County, Washington, is the ROI for this analysis.

3.2.10.1 Baseline Conditions

3.2.10.1.1 Population

In 2010, the population of Spokane County totaled 471,221 persons (U.S. Census 2010d). Between 2000 and 2010, the ROI population increased at an average annual rate of 1.2 percent, with a total increase of approximately 53,282 persons (U.S. Census 2000d, 2010d). The City of Spokane, the most populated city in Spokane County and the county seat, experienced an annual 0.7 percent increase over the 10-year period (U.S. Census 2000e, 2010e). The population in Washington totaled 6,724,540 persons in 2010, and increased at an average annual growth rate of 1.3 percent between 2000 and 2010 (U.S. Census 2000f, 2010f) (see Table 3-16).

Table 3-16. Population for the City of Spokane, Spokane County, and Washington

Location	2000	2010	Annual Percent Change (2000–2010)
City of Spokane	195,629	208,916	0.7%
Spokane County	417,939	471,221	1.2%
Washington	5,894,121	6,724,540	1.3%

Source: U.S. Census 2000d, 2000e, 2000f, 2010d, 2010e, 2010f.

As shown in Table 2-10, Fairchild AFB has a total work force of 4,486. This includes 3,334 full-time military personnel, 531 DoD civilians, and 621 other base personnel. In addition, there are 3,906 military dependents and family members associated with the full-time military personnel. Approximately 1,947 part-time Guardsmen are also located at Fairchild AFB, but because they are not considered full-time, they were not considered part of the work force for this analysis.

3.2.10.1.2 Economic Activity (Employment and Earnings)

In 2011, the most recent data available, employment in Spokane County totaled 264,706 jobs (BEA 2012). The largest employment sectors in Spokane County were government (14.9 percent), followed by health care and social assistance (14.4 percent) and retail trade (11.6 percent) (BEA 2012). Construction accounted for 5 percent of total employment. In 2012, the unemployment rate in Spokane County was 8.6 percent (BLS 2013a). The county unemployment rate was higher than the state (8.2 percent) and the Nation (8.1 percent) (BLS 2013b). As of April 2013, the monthly unemployment rate (not seasonally adjusted) for Spokane County was estimated at 7.5 percent (BLS 2013c).

Fairchild AFB is an important contributor to the Spokane County economy through employment of military and civilian personnel and expenditures for goods and services. The total economic impact of the base on the surrounding communities between October 2011 and September 2012 was $461,312,652. The payroll for military, DoD civilians, and other base personnel was $226,010,439. An estimated $23,540,250 worth of MILCON also occurred on base in 2011 (Fairchild AFB 2011d).

3.2.10.1.3 Housing

Table 3-17 presents census-derived housing data for the City of Spokane and Spokane County. In 2010, Spokane County had 201,434 total housing units, of which 7.1 percent (14,267 units) were vacant (U.S. Census 2010d). Approximately 47 percent of the total housing units located in Spokane County are within the City of Spokane. Of those housing units in the city, approximately 7.4 percent (7,020) were vacant at the time of the 2010 Census (U.S. Census 2010e). Of the vacant housing units in the city and county, almost half were available for rent.

Table 3-17. Housing Data for the City of Spokane and Spokane County

Location	Housing Units	Occupied	Vacant	For Rent
City of Spokane	94,291	87,271	7,020	3,277
Spokane County	201,434	187,167	14,267	6,047

Source: U.S. Census 2010d, 2010e.

There are three housing options available at Fairchild AFB: privatized housing, unaccompanied housing, and housing in the local community. Military family housing at Fairchild AFB is privatized and owned by Balfour Beatty Communities. There are four neighborhoods with a total of 641 single-family homes on Fairchild AFB, with a current occupancy rate of 97 percent (USAF 2013e).

There are 10 dormitories with a total of 472 dormitory units for unaccompanied Airmen in the rank of E-1 to E-4 with less than 3 years of service on Fairchild AFB (USAF 2013e). Housing in the local community is available for unaccompanied Airmen in the ranks of E-4 with 3 or more years of service.

3.2.10.1.4 Education

Spokane County is located in Educational Service District 101. There are 289 school districts within Educational Service District 101. Spokane County includes parts of, or all of, 18 different school districts. There are five school districts located in the City of Spokane. The Spokane Public School District is the largest school district in eastern Washington and the second largest in Washington, with 34 elementary schools, six middle schools, and five high schools. Total enrollment in the Spokane Public School District during the 2012–2013 school year was approximately 29,275 students and 1,758 classroom teachers, for a student-to-teacher ratio of 16.6:1 (Spokane District Schools 2013). The average class size for general education, as defined by the Washington State Legislature, is 25.23 for kindergarten through third grade, and ranges from 27–28.7 for fourth grade and up (Washington State Legislature 2011).

There is one elementary school located on the base. The Michael Anderson Elementary School is for children in pre-kindergarten through fifth grade and is part of the Medical Lake School District. There are three elementary schools, one middle school, one high school, and one alternative high school in the district. As of May 2012, there were 1,916 students enrolled in the district and 110 classroom teachers, for a student-to-teacher ratio of 17.4:1 (OSPI 2012). During the same time, there were 436 students enrolled in Michael Anderson Elementary School and 28 classroom teachers, for a student-to-teacher ratio of 15.6:1 (OSPI 2012).

3.2.10.1.5 Public Services

Public services in Spokane County include law enforcement, fire protection, emergency medical services, and medical services. The Spokane County Sheriff’s Department provides law enforcement services for the county and employs approximately 242 officers (Spokane County 2007). In addition to the Sheriff’s Department, there are numerous law enforcement agencies in the area.

Spokane County has 7 municipal fire departments and 11 fire districts that provide service to the county. Spokane Emergency Management provides emergency management services for all cities, towns, and unincorporated areas in Spokane County (Spokane County 2012). The closest emergency rooms are at Providence Sacred Heart Medical Center and Deaconess Medical Center, both about 20 minutes away in Spokane.

3.2.10.1.6 Base Services

The 92nd Medical Group is an outpatient clinic that offers a dedicated primary care team approach to help prevent illness, treat injuries, and promote healthy lifestyle changes for more than 11,000 beneficiaries, including active-duty members, retirees, and their families.

Other base services include dining facilities, recreation and fitness centers, and youth and family services. Dining facilities include the Roger A. Ross and Warrior Dining Facilities. Recreation facilities include an aquatic center, bowling lanes, and a fitness center. Youth and family services on base include a CDC, family child care, a youth center, a preteen center, and a teen center. The CDC serves over 200 children six weeks old through kindergarten (92nd FSS 2013).

3.2.11 Environmental Justice and the Protection of Children

Spokane County, Washington, represents the region of comparison for evaluating disproportionate effects (in Chapter 4) on populations of concern for environmental justice and for children. Table 3-18 shows that the proportion of minority persons in Spokane County is much lower than the State of Washington and the Nation as a whole. Low-income persons compose a slightly higher proportion of the county's population than in the State of Washington, but the county's proportion is typical of the Nation's. The proportion of children in the county population is similar to that in the State of Washington and the Nation.

Table 3-18. Characterization of Environmental Justice Populations for Fairchild AFB

Location	Total Population	Minority		Low-Income[a]	Youth	
		Number	Percent	Percent	Number	Percent
Spokane County	471,221	62,592	13.28%	14.40%	109,502	23.24%
Washington	6,724,540	1,847,736	27.48%	12.50%	1,581,354	23.52%
United States	308,745,538	111,927,986	36.25%	14.30%	74,181,467	24.03%

[a] 2007–2011 estimate; all other values based on 2010 census.
Source: U.S. Census 2010d, 2010f, 2012.

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3.3 GRAND FORKS AIR FORCE BASE

This section of Chapter 3 describes the baseline conditions of the environmental resources anticipated to be affected by implementation of the KC-46A MOB 1 scenario at Grand Forks AFB and, when applicable, in areas surrounding the base. The baseline resource conditions are described to the level of detail necessary to support analysis of the potential impacts that could result from implementation of the KC-46A MOB 1 scenario at Grand Forks AFB.

3.3.1 Noise

Noise, which is defined as unwanted sound, has the potential to affect several resource areas evaluated in this Final EIS. Background information on the regulatory setting and methodology for noise is contained in Volume II, Appendix B, Sections B.1.2 and B.1.3.

3.3.1.1 Base-Affected Environment

The current mission at Grand Forks AFB is described in Section 2.4.3 and includes the Predator, Predator B, and Global Hawk remotely piloted aircraft (RPA). Table 3-19 shows noise levels of the aircraft currently based at Grand Forks AFB at different heights above the ground during landings and takeoffs. Aircraft flying at higher altitudes may have slightly lower noise levels than shown in Table 3-19 because flaps and gear may not be deployed as they would when in landing or takeoff configurations. The noise levels in this table are presented as SELs (in dB), which are the sum of sound energy during the noise event.

Table 3-19. Aircraft Noise Levels at Grand Forks AFB

Aircraft	Power Setting	SEL at Overflight Distance (in dB)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
Predator (MQ-1)	50% RPM	77	73	68	63	56	49
Predator B (MQ-9)	50% RPM	82	78	73	68	60	53
Global Hawk (RQ-4)	87% RPM	101	97	92	86	78	70
Takeoff							
Predator (MQ-1)	100% RPM	87	82	78	72	65	58
Predator B (MQ-9)	100% RPM	85	81	76	72	65	58
Global Hawk (RQ-4)	100% RPM	117	113	108	102	93	85

Note: Aircraft airspeed is 160 knots. Aircraft operate at various airspeeds in and around the airfield.
Key: Power Unit: RPM – revolutions per minute
Source: NOISEMAP 7.2 Maximum Omega 10 Results; T-41 used as surrogate noise source for MQ-1; Cessna 441 used as surrogate noise source for MQ-9 (noise reduced 3 dB to account for one TPE331 engine on MQ-9 rather than two on Cessna 441); T-45 used as surrogate noise source for RQ-4.

Of the 14,946 annual operations conducted at Grand Forks AFB, 24 percent occur at night between 10:00 P.M. and 7:00 A.M. Due to the potential for night noise to be particularly intrusive, noise events occurring during this time period are assessed a 10 dB penalty when calculating DNL.

Figure 3-3 shows noise contours reflecting current operations at Grand Forks AFB that were calculated using NOISEMAP (Version 7.2). As a point of reference, Figure 3-3 also shows the 65 dB DNL noise contours published in the 2010 EIS for the BRAC Beddown and Flight Operations of Remotely Piloted Aircraft at Grand Forks AFB (USAF 2010c).

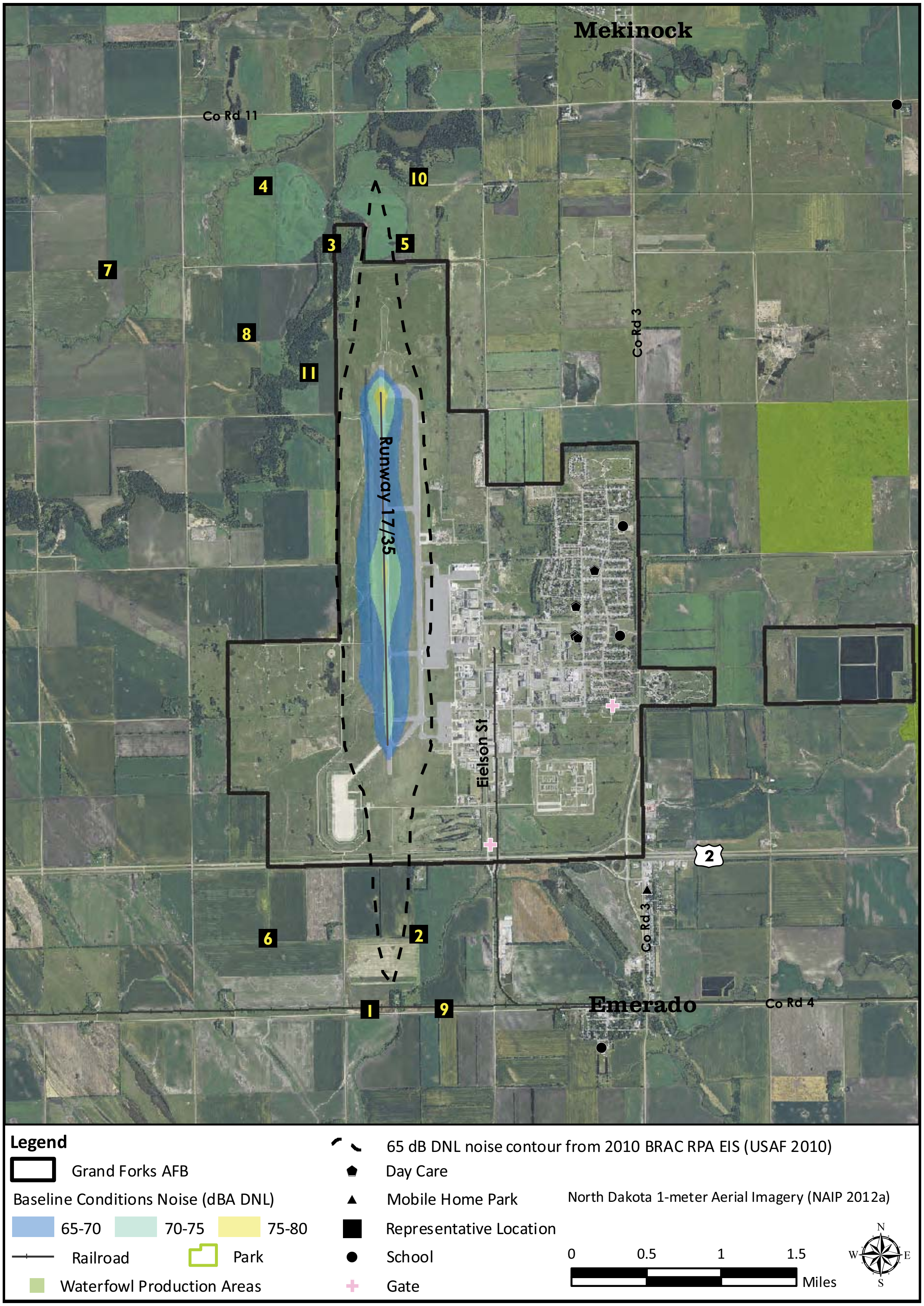

Figure 3-3. Grand Forks AFB Baseline Noise Contours

Differences between baseline noise contours and those published in the 2010 EIS are a result of an update of operations data and changes in noise modeling methods. Operations data were updated based on interviews with pilots, maintainers, and air traffic control personnel in March 2013. Noise contours included in the 2010 EIS were calculated using NOISEMAP in conjunction with the program Integrated Noise Model (INM). To maintain consistency of methods, baseline noise levels were calculated using NOISEMAP. Baseline noise levels were also calculated accounting for the effects of local terrain (e.g., hills and valleys) and ground impedance (e.g., grass absorbs sound energy to a greater degree than water).

Table 3-20 shows that no land or off-base residents are exposed to noise greater than 65 dB DNL. It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed, and this has been accepted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.3.7 and Volume II, Appendix C , Section C.1.3.1). Per DoD policy, the 80 dB DNL noise contour is used to identify populations most at risk of potential hearing loss (USD 2009). If no residence or populated area is within the 80 dB DNL contour, then no further risk assessment is warranted. Aircraft noise levels of 80 dB DNL or greater do not occur at Grand Forks AFB under current conditions. The risk of hearing loss among workers at Grand Forks AFB is assessed and managed in accordance with DoD, OSHA, and NIOSH regulations regarding occupational noise exposure.

Table 3-20. Population and Acreage Affected Under Noise Contours Near Grand Forks AFB, Baseline Conditions

Noise Level (dB DNL)	Baseline Conditions		
	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	0	0	341
70–74	0	0	114
75–79	0	0	10
80–84	0	0	0
≥85	0	0	0
Total	**0**	**0**	**465**

Note: Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Table 3-21 presents noise conditions at several representative locations in the area surrounding Grand Forks AFB. The representative locations depicted on Figure 3-3 were established based on central points of U.S. Census subdivisions, and therefore do not represent a specific noise-sensitive receptor. The areas in the vicinity of the representative locations are expected to experience similar aircraft noise levels. None of the 11 locations studied experience noise levels greater than 65 dB DNL. At the locations surveyed, based Global Hawk departure and pattern operations and transient aircraft (i.e., KC-10A or KC-135) departure operations are the operations types generating the highest SELs. A more detailed description of operations generating the highest SELs can be found in Table C-1-3 in Volume II, Appendix C, Attachment C-1.

In accordance with AFI 13-201, base flying procedures have been designed to minimize impacts on the surrounding community while maximizing operational capacity and flexibility. Grand Forks AFB aircraft should avoid flying over the base housing area below 2,400 feet MSL, with the exception of approved overflights for photos or mosquito spraying, and aircraft should avoid flying over the City of Grand Forks below 5,000 feet MSL. There has not been a noise complaint in the community around Grand Forks AFB in the last 10 years.

Table 3-21. Grand Forks AFB Representative Locations Under Baseline Conditions

Location ID	Baseline Conditions	
	DNL (dB)	Top 5 SELs (dB)[a]
1	53	91–97
2	54	93–97
3	54	90–97
4	49	81–93
5	55	93–98
6	47	80–92
7	46	78–85
8	49	80–93
9	50	87–96
10	53	89–96
11	54	85–97

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Volume II, Appendix C, Attachment C-1).

3.3.2 Air Quality

Air emissions produced from construction and operation of the KC-46A aircraft at Grand Forks AFB mainly would affect air quality within Grand Forks County. In North Dakota, the North Dakota Department of Health (NDDH) is responsible for enforcing air pollution regulations. The NDDH uses the NAAQS to regulate air quality within North Dakota and establishes state standards with concentrations that are at least as restrictive as the NAAQS (NDDH 2011). Additional background information on the CAA, the NAAQS, and the North Dakota Ambient Air Quality Standards (NDAAQS) is contained in Volume II, Appendix B, Section B.2. Information on regional climate is contained in Volume II, Appendix D, Section D.3.

The NDDH Division of Air Quality enforces the NAAQS and NDAAQS by monitoring state-wide air quality and developing rules to regulate and permit stationary sources of air emissions. The Air Pollution Control Rules for the State of North Dakota are found in Article 33-15 of the *North Dakota Century Code*, Chapter 23-25. Grand Forks AFB currently operates under a Division of Air Quality Title V permit.

3.3.2.1 Region of Influence and Existing Air Quality

Air emissions produced from construction and operation of the KC-46A aircraft at Grand Forks AFB would primarily affect air quality within Grand Forks County. Due to lack of substantial air emission sources within the region, Grand Forks County is in attainment of the NAAQS and NDAAQS for all pollutants (NDDH 2012a).

3.3.2.1.1 Regional Air Emissions

Table 3-22 summarizes estimates of the annual emissions generated by Grand Forks County in CY 2008 (USEPA 2013a). The majority of emissions within the region occur from (1) on-road and nonroad mobile sources (VOCs, CO, and NO_x), (2) solvent/surface coating usages (VOCs), and (3) fugitive dust from unpaved roads and agricultural tillage (PM_{10}/$PM_{2.5}$).

Table 3-22. Annual Emissions for Grand Forks County, North Dakota, CY 2008

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Stationary Sources	7,119	2,564	1,087	647	14,451	2,608	2,141
Mobile Sources	1,083	11,678	2,968	37	219	180	477,022
Total	**8,202**	**14,242**	**4,054**	**684**	**14,670**	**2,788**	**479,163**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons
Source: USEPA 2013a.

3.3.2.1.2 Grand Forks AFB Emissions

Operational emissions due to existing operations at Grand Forks AFB occur from (1) RPA operations and engine maintenance/testing, (2) AGE, (3) GMVs and POVs, (4) offsite POV commutes, (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and area sources. Table 3-23 summarizes the most recent estimate of annual operational emissions that occurred at Grand Forks AFB (CY 2012). Data needed to calculate existing emissions at Grand Forks AFB were obtained from (1) the project noise analyses for aircraft operations, (2) the *2011 Actual and Potential Air Emissions Inventory for Grand Forks Air Force Base* (Sullivan-Weston Services JVA, LLC 2012), and (3) activity data collected for 2012 operations. Due to missing data, CY 2012 emissions for aircraft engine maintenance/testing, AGE, GMVs, and nonroad equipment were estimated by factoring data used for the 2012 Fairchild AFB emissions inventory. Emission factors used to calculate combustive emissions for the KC-135 aircraft were based on emissions data developed by CFM International for the CFM56-2B1 engine (ICAO 2013a). The data in Table 3-23 also are used to estimate non-aircraft source emissions for the future project scenarios at Grand Forks AFB. Volume II, Appendix D, Section D.3, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from existing sources at Grand Forks AFB.

Table 3-23. Annual Emissions from Existing Operations at Grand Forks AFB, CY 2012

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
RPA Operations	0.56	2.48	12.73	1.04	0.23	0.23	2,910
Transient Aircraft Operations	0.52	1.90	1.18	0.12	0.29	0.29	199
On-Wing Aircraft Engine Testing – Unmanned Aircraft System	0.17	0.71	0.80	0.10	0.02	0.02	290
Aerospace Ground Support Equipment	0.06	0.44	0.52	0.01	0.07	0.06	63
GMVs/Nonroad Equipment	0.02	0.32	0.42	0.00	0.02	0.02	84
Privately Owned Vehicles – On Base	0.28	9.96	2.56	0.02	0.14	0.09	1,320
Privately Owned Vehicles – Off Base	2.53	82.80	18.66	0.16	1.52	0.91	10,584
Mobile Fuel Transfer Operations	0.04	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	22.39	12.59	16.57	0.10	7.95	1.33	[a]
Total Emissions	**37.47**	**111.21**	**53.46**	**1.56**	**10.24**	**2.95**	**15,423**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

3.3.3 Safety

The safety resource area applies to activities in the air and on the ground associated with aircraft flight and operation. Flight safety considers the aircraft flight risks, including the potential for bird/wildlife-aircraft strike hazard. Ground safety considers issues associated with operations and maintenance activities that support base operations, including fire response. Background information on the regulatory setting and methodology for safety is contained in Volume II, Appendix B, Sections B.3.2 and B.3.3.

3.3.3.1 Flight Safety

In 2010, Grand Forks AFB transitioned to the use of RPA within the airfield and airspace environment. Prior to this transition in 2010, Grand Forks AFB hosted the KC-135 mission. There have been no recorded KC-135 accidents in the vicinity of Grand Forks AFB (Hoctor 2009).

The KC-135 aircraft that were previously stationed at Grand Forks AFB and the future KC-46A have the ability to jettison fuel during emergency situations. Data on historical KC-135 operations show that slightly less than two sorties per thousand resulted in a release of fuel (AMC 2013). The ability to land the KC-46A at a much higher weight than the KC-135 would be expected to reduce the frequency of fuel releases for the KC-46A. As such, it is expected that KC-46A sorties would experience a lower frequency of fuel releases.

It is the policy of the USAF MAJCOMs to follow AFIs or supplement those AFIs that have been established. These policies require that pilots avoid fuel jettison, unless safety of flight dictates immediate jettison. For example, AMC policy, which covers all USAF tanker assets, requires that, whenever possible, any fuel released from an aircraft must occur above 20,000 feet AGL (AMC 2004, 2012). This policy is designed to minimize potential impacts of fuel jettison events.

The main environmental concern from fuel released from an aircraft is the deposition of fuel onto the ground and/or surface waters and subsequent negative impact on human health or natural resources. The results of a definitive study on the fate of jettisoned fuel from large USAF aircraft (e.g., KC-135) (Deepti 2003) were used to identify a reasonably conservative ground-level fuel deposition value for the KC-46A. This study used the Fuel Jettison Simulation model developed by the USAF to estimate the ground deposition of fuel from jettison events (Teske and Curbishley 2000). This maximum ground-level fuel deposition value identified for the KC-46A would result in effects that are well below known natural resource and human health thresholds for jet fuel. Therefore, the maximum fuel deposition value expected from the KC-46A would not produce substantial impacts on human health or natural resources. In view of this, no further analysis is included in this section.

3.3.3.1.1 Wildlife Strike Hazard at Grand Forks AFB and Vicinity

Cliff swallows are generally considered the most problematic bird species at Grand Forks AFB. The abundant mud nests built on the sides of hangars and other base buildings cause problematic aircraft operations. Cliff swallows are agile and graceful aerial predators of insects. Under the rules of the annual Grand Forks AFB Federal Fish and Wildlife Permit issued by the USFWS Migratory Bird Permit Office in Denver, Colorado, cliff and barn swallow nests and adults may be destroyed. The taking of birds only occurs when absolutely necessary for safety and health reasons along the flightline. Only birds listed on the Federal Fish and Wildlife Permit may be taken. Flight restrictions for takeoffs and landings, administered by the BASH working group, are implemented when necessary to protect pilots and aircraft during peak bird migration (Grand Forks AFB 2011a).

3.3.3.2 Ground Safety

Grand Forks AFB maintains one runway (RW 17-35). The most current APZ and CZ delineation is based upon legacy aircraft previously stationed at Grand Forks AFB (KC-135). Therefore, the CZs at Grand Forks AFB are established at 3,000 feet wide by 3,000 feet long. APZ I is 3,000 feet wide by 5,000 feet long, and APZ II is 3,000 feet wide by 7,000 feet long. These are very conservative with regard to the current RPA mission, but are suitable for other aircraft that may use the runway. There is no incompatible development projected and no existing incompatible development within the CZ or APZ.

The USAF fire department provides fire and crash response at Grand Forks AFB. The department is also part of mutual-aid agreements with the local fire departments, thus ensuring availability of additional support if required.

3.3.4 Soils and Water

3.3.4.1 Soil Resources

Grand Forks AFB is located in the Central Lowland physiographic province in the North Valley of the Red River. Soil underlying the base is primarily of the Antler-Gilby-Svea, Bearden-Antler, and Glyndon-Gardena associations. The soil of these associations is deep, level to nearly level, and somewhat poorly drained to moderately well-drained, characterized by a high shrink-swell potential, low infiltration rate, and high available water capacity (Grand Forks AFB 2011a).

3.3.4.2 Water Resources

3.3.4.2.1 Surface Water

Grand Forks AFB is located within the Red River Basin. Surface water features located in the vicinity of the base are the Turtle River and Kellys Slough National Wildlife Refuges (NWRs). The Turtle River flows in a northeasterly direction across the northwest corner of the base. It joins the Red River approximately 25 miles northeast of the base.

Underground concrete pipes and catchment basins collect stormwater run-off from the base. Run-off is conveyed through four grassy drainage ditch outfalls. Several drainage ditches are equipped with control devices capable of handling accidental spills by containing the affected waters until the appropriate treatment has been made (Grand Forks AFB 2011a). Discharges from the west and northwest ditches flow into the Turtle River. Discharges from east of the base, via the south and north ditches, flow into Kellys Slough NWR and, subsequently, the Turtle River. As the Turtle River merges with the Red River northeast of the base, all drainage from the base ultimately flows into the Red River.

To manage stormwater run-off and to protect the quality of surface water on base and in the vicinity of the base, Grand Forks AFB has been issued an NPDES general stormwater permit. As part of this permit, the base analyzes stormwater samples for all permit-required parameters. Stormwater discharges have historically been in compliance with permit requirements.

3.3.4.2.2 Groundwater

The Emerado and Dakota Aquifers occur under Grand Forks AFB 50–200 feet below the ground. The principal aquifer is the Dakota Aquifer, which is a widespread aquifer extending across much of the central North American continent. Water from this aquifer is highly saline; contains excessive iron, chloride, total dissolved solids, and sulfate; and is generally unsatisfactory for domestic and most industrial uses (Kelly and Paulson 1970).

3.3.4.2.3 Floodplains

The 100-year floodplain of the Turtle River is located in the northwest corner of the base. A portion of the 100-year floodplain of a tributary to Kellys Slough is located in the southeast corner of the base near the sewage lagoons.

3.3.5 Biological Resources

3.3.5.1 Vegetation

Historically, tall and mixed grass prairie dominated the land associated with and surrounding Grand Forks AFB (Grand Forks AFB 2011a). Trees and shrubs were limited in this region, although woodland patches were present in stream valleys and other depressions. Today, native grass communities have largely been converted to agriculture. Suppression of fire has encouraged the invasion of shrubs and trees into what few prairie remnants remain.

Improved areas of the base include developed areas that have lawns and landscape plants that are regularly maintained. Some portions of the semi-improved and unimproved areas of the base have been reseeded with a variety of native grasses. Grass heights within semi-improved areas, including airfield areas within 300 feet of the runway centerline, are maintained at 7 to 14 inches. Beyond the 300-foot border on the airfield, hay cutting dictates vegetation height. Substantial portions of the unimproved areas on the base are used for hay production. There are no known prairie remnants on Grand Forks AFB; however, some prairie index species (such as coneflowers) are found in the unimproved and semi-improved areas mixed in with brome grass and various herbaceous plants such as goldenrod (*Solidago* sp.). The 60-acre Prairie View Nature Preserve is located in the northeast corner of Grand Forks AFB.

Trees and shrubs make up less than 5 percent of the land cover at Grand Forks AFB and are primarily located in the housing areas and in planted shelterbelts and riparian areas along Turtle Creek (Grand Forks AFB 2011a).

3.3.5.2 Wildlife

Information on wildlife occurring on Grand Forks AFB is provided in the INRMP (Grand Forks AFB 2011a). Native wildlife documented on the base includes a variety of mammals and birds. White-tailed deer, coyote, beaver (*Castor canadensis*), and red fox (*Vulpes vulpes*) are the most common large mammals, and the most common small mammals include the red squirrel (*Tamiasciurus hudsonicus*), grey squirrel (*Sciurus carolinensis*), white-tailed jackrabbit, Richardson's ground squirrel (*Spermophilus richardsonii*), and the plains pocket gopher (*Geomys bursarius*). Two carcasses of the fisher (*Martes pennanti*), once considered extirpated in North Dakota, were recently documented on the base.

Although no amphibian or reptile studies have been conducted at Grand Forks AFB, a variety of species are known to occur in Grand Forks County and could occur on base. These include the common garter snake, painted turtle (*Chrysemys picta*), Canada toad (*Bufo hemiphrys*), American toad (*Bufo americanus*), and wood frog (*Rana sylvatica*).

Grand Forks AFB is located in a zone of overlap between the Mississippi and Central Flyways (Grand Forks AFB 2010a). Therefore, bird species documented on the base include migratory species such as waterfowl and neotropical migrants. A total of 79 neotropical migrant species have been documented in various habitats on the base (Driscoll 2012).

3.3.5.3 Special-Status Species

No federally threatened or endangered species are known to occur at Grand Forks AFB. There is no critical habitat known to occur on base (USFWS 2013c). Eight special-status species are known to occur at Grand Forks AFB. North Dakota does not have a state endangered species act; instead, the state's Nature Preserves Act (NDCC 55-11) gives the North Dakota Parks and Recreation Department the responsibility to set aside a system of natural areas and nature preserves for the benefit of North Dakota citizens (NDPRD 2013). The North Dakota Natural Heritage Program (NDNHP) is administered under this act. The NDNHP uses an international system for ranking rare, threatened, and endangered species within the State of North Dakota. Species are ranked on a scale of one to five, primarily based on the number of known occurrences. The NDNHP develops a list of species along with their state rank identified as critically imperiled (S1), imperiled (S2), rare or uncommon (S3), apparently secure (S4), or secure (S5).

Table 3-24 presents the Federal and state-listed species identified as either occurring or potentially occurring at Grand Forks AFB (NDPRD 2013; USFWS 2013b). Only state special-status species classified as S1 or S2 are listed in the table.

Table 3-24. Special-Status Species that Could Occur at Grand Forks AFB

Common Name	Scientific Name	Status		Occurrence at Grand Forks AFB
		Federal[a]	State[b]	
Birds				
Whooping crane	*Grus americana*	FE, MBTA	SX	No
Bald eagle	*Haliaeetus leucocephalus*	MBTA, BGEPA	S1	Yes
American peregrine falcon	*Falco peregrinus anatum*	MBTA	S1	Yes
Yellow rail	*Coturincops noveboracensis*	-	S2	Yes
Mammals				
Fisher	*Martes pennanti*	-	S2	Yes
Reptiles/Amphibians				
Northern leopard frog	*Rana pipens*	-	S1	Yes
Plants				
Dutchman's breeches	*Dicentra cucullaria*	-	S1	Yes
Lesser yellow lady's slipper	*Cypripedium parviflorum* var. *parviflorum*	-	S2/S3	Yes
White lady's slipper	*Cypripedium candidum*	-	S2/S3	Yes

[a] U.S. Fish and Wildlife Service

[b] North Dakota Parks and Recreation Department

Key: BGEPA – protected under the Bald and Golden Eagle Protection Act; FE – listed as endangered under the Endangered Species Act; MBTA – protected under the Migratory Bird Treaty Act; SX – state-listed as extirpated under the Nature Preserves Act; S1 – state-listed as critically imperiled; S2 – state-listed as imperiled; S3 – state-listed as rare or uncommon

Source: Grand Forks AFB 2011a; NDPRD 2013; USFWS 2013b.

The bald eagle has been observed near the sewage lagoons on Grand Forks AFB (Grand Forks AFB 2011a) (see Table 3-24). There is a documented bald eagle nest approximately 2 miles east of the base on the west side of the Kelly Slough NWR. During the 2009 winter bird survey (Grand Forks AFB 2010a), a bald eagle was observed near the Turtle River riparian area. American peregrine falcons (*Falco peregrinus anatum*) were observed at the sewage lagoons in 2009 and at the base water tower in 2011. No nests have been observed at Grand Forks AFB. An unconfirmed yellow rail (*Coturincops noveboracensis*) sighting was reported in 2008 at the main base.

Fisher carcasses have been found at the base, and the northern leopard frog (*Rana pipens*) has been observed in wetland areas throughout the base.

Three state-classified plant species (S1 and S2) were documented at Grand Forks AFB during a 2009 biological survey (Grand Forks AFB 2011a) (see Table 3-24). Dutchman's breeches (*Dicentra cucullaria*) was discovered in the Turtle River Lowland Woodlands/riparian forest, located in the northwestern portion of the base. The lesser yellow lady's slipper (*Cypripedium parviflorum* var. *parviflorum*) and the white lady's slipper (*Cypripedium candidum*) orchids were both found growing in intermixing patches, just west of the airfield. A new population of lesser yellow lady's slipper was also discovered growing in the grassy area north of the former munitions depot.

3.3.5.4 Wetlands

Because Grand Forks AFB is located in the prairie potholes region, wetlands are common in this area. Approximately 308 acres of wetlands have been identified at Grand Forks AFB (Grand Forks AFB 2011a). Most of these are less than an acre and are typical of wetlands in highly disturbed, intense agricultural areas where watershed quality has been compromised. A recent wetland survey was conducted at the location of the proposed KC-46A facilities. Approximately 2 acres of emergent wetlands were identified in the project area.

3.3.6 Cultural Resources

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources.

3.3.6.1 Architectural

Two architectural inventories have been conducted on Grand Forks AFB (Grand Forks AFB 2011b). In 1994, a Cold War-era properties survey evaluated 27 buildings and structures that were associated with the Cold War mission. In 2011, the base conducted a Section 110 inventory of 91 buildings built between 1956 and 1965. All buildings on Grand Forks AFB that are 50 years of age or older or that were associated with the Cold War era have been evaluated (Grand Forks AFB 2012b). With the exception of several unaccompanied personnel housing buildings, all the facilities evaluated have been determined non-eligible for the NRHP. The North Dakota SHPO has concurred with this determination. Although the unaccompanied personnel housing buildings are considered NRHP-eligible, the USAF has an agreement in place with the SHPO to allow for demolition or renovation since the impacts have been mitigated DoD-wide through completion of a mitigation program (ACHP 2006).

3.3.6.2 Archaeological

Two archaeological surveys have been conducted on Grand Forks AFB (Grand Forks AFB 2012b). Twelve archaeological resources have been recorded on the base: one prehistoric site, five historic sites, three prehistoric isolated finds, and three historic isolated finds. None of the archaeological resources are eligible for the NRHP.

3.3.6.3 Traditional

Grand Forks AFB has identified 23 tribes typically consulted with as part of the NEPA and Section 106 processes. This list of tribes is contained in Table A-1 in Volume II, Appendix A, Section A.3. There are no known tribal sacred sites or properties of traditional religious and cultural importance in the vicinity of Grand Forks AFB.

3.3.7 Land Use

Grand Forks AFB is located in Grand Forks County, North Dakota, in a predominantly agricultural area. The City of Grand Forks is approximately 15 miles east of the base.

3.3.7.1 Base

The GP, last updated in 2006, defines the construction opportunities and existing land use at the base. The airfield and surrounding open space are the dominant land uses and cover the central to central-west portion of the base. The cantonment area, or community-focused area, is located east of the airfield. This area includes the administrative, housing (both for families and unaccompanied personnel), medical, and community land uses (commercial). Three youth/day care centers and two schools are also located in the eastern part of the base in the community-oriented and residential areas. Outdoor recreation (including a golf course on the south end of the airfield) and open space provide a buffer between the airfield functions and the cantonment area, and the base and the surrounding area. The GP describes future changes in land use on the base that will consolidate administrative uses into two areas, and aircraft operations and maintenance areas will expand into one continuous band east of the parking aprons (Grand Forks AFB 2006a).

The base manages a program for leasing open areas around the airfield for hay cultivation. One hay lease, totaling 664 acres, is currently active. Some of these agricultural operations extend outside of the airfield fence (USAF 2007b). The base has plans to expand the hay cultivation program, using open and undeveloped land away from the active mission support and industrial areas.

3.3.7.2 Surrounding Areas

As shown on Figure 3-3, the area surrounding Grand Forks AFB is rural, consisting primarily of agriculture and open space (pasture, recreation, and wildlife habitat), with scattered residences. The small community of the City of Emerado, with a population under 500 persons, is immediately adjacent to the base on the southeast corner. Other small farming communities in the surrounding area include Arvilla and Mekinock.

Developed and community-type uses near Grand Forks AFB include the mobile home park to the south; the University of North Dakota-owned biological research area adjacent to the base western boundary; Mekinock, an unincorporated community approximately 3 miles northeast of the base; and the base sewage treatment system on a separate parcel of land east of the main base.

Grand Forks AFB has three avigation easements to limit future land use or structural changes to some properties to the north, south, and west of the runway. Grand Forks AFB is bordered by lands in Mekinock Township to the west and north, and Blooming Township to the east. Oakville Township is located to the south-southeast, and Chester Township is located to the south. Per the Grand Forks County 2035 Land Use Plan, Grand Forks County has jurisdiction over the land use and zoning within Blooming and Chester Townships (GF 2006). Several townships manage the zoning of land within their jurisdiction. In general, the areas to the north and west that are zoned by the townships have adopted airfield protective ordinances. Zoning within Mekinock Township to the west of the base restricts residential land use to one dwelling per quarter section (USAF 2003b). Grand Forks County has enacted airfield protective zoning for the areas to the south and east of the airfield (excluding the City of Emerado).

The City of Emerado is zoned as an incorporated municipality and manages its zoning (GF County 2013). The town is mostly residential, with some business driven by the base population. The City of Emerado is its own jurisdiction for zoning regulations. These zoning

regulations were originally approved as City Code, Chapter XVII, in 1980 and updated in 1999. These apply to all lands within the city and an area extending one-half mile in all directions from the corporate boundaries of the city.

The base privatized housing area is located on the east side of the base. Agricultural land dominates the area between the eastern base border and Grand Forks International Airport, located approximately 8 miles away. The trend for future land use around the base is agricultural (GF County 2006).

Figure 3-3 shows that noise exposure for Grand Forks AFB is confined to the base airfield. This reflects the absence of the large aircraft that formerly operated at the base. The current RPA mission does not generate any consequential noise. Currently, no land outside the base is exposed to noise levels of 65 dB DNL or greater.

An AICUZ study was completed for Grand Forks AFB in 1995 and revalidated in 2003 for the KC-135, HH-1H, C-12, and numerous transient aircraft from other bases. The AICUZ study documents flight operations and proposes compatible use guidelines for land areas surrounding the base with future planning and zoning activities. The 2003 AICUZ update did not find any incompatibilities with the airfield, airfield activities, and the adjacent and surrounding land uses from a noise perspective (USAF 2003b), although a few farm-related structures are located in the north and south APZs. A pre-JLUS was conducted in 2004, but based on its findings at that time, it was determined that a full JLUS was not necessary.

3.3.8 Infrastructure

3.3.8.1 Potable Water System

Potable water is provided to Grand Forks AFB by the City of Grand Forks. Potential secondary sources of water are from Aggasiz Water District and the Grand Forks-Trail Rural Water District. The pumping capacity from the City of Grand Forks to Grand Forks AFB is 1.9 MGD, but the water system on Grand Forks AFB can accommodate up to 2.5 MGD. The water storage capacity of the four elevated tanks located at Grand Forks AFB is 1.9 MG (Grand Forks AFB 2006a). Current average daily water use is 0.3 MGD, which is 16 percent of the base system capacity.

3.3.8.2 Wastewater

The sanitary sewer system on Grand Forks AFB is operated by the base and consists of a wastewater collection system and a series of treatment lagoons. The system was designed to support a population of approximately 10,000 (Klaus 2013). Sewage flows to the treatment facility by gravity and force mains. There are nine lift stations in the system and four treatment cells/lagoons (one primary, two secondary, and one tertiary). The lagoons have a total holding capacity of approximately 250 MG and have adequate capacity for future base expansion (Grand Forks AFB 2006a). Grand Forks AFB is authorized to discharge from its wastewater stabilization ponds to surface water in Kellys Slough. There are no limitations on flow volume; however, effluent restrictions are imposed by the Grand Forks AFB NPDES permit.

3.3.8.3 Stormwater System

Stormwater is collected from nine drainage areas (northeast, northwest, west, and southeast sections of the base) and is delivered to four separate drainage ditches constructed and maintained by the base. During periods of heavy rainfall or snowmelt, stormwater flows into the wetlands located along the base boundaries. The stormwater drainage system consists of open channels, catch basins, and underground concrete pipes, as well as paved and unpaved ditches

(Grand Forks AFB 2006a). The details of the stormwater permit for Grand Forks AFB are described in Section 3.3.4.2.1. The permit does not, however, authorize stormwater discharges associated with construction activities. A separate Notice of Intent and SWPPP must be filed for all new construction activities that disturb 1 or more acre.

3.3.8.4 Electrical System

Nodak Electric Cooperative supplies electrical power to Grand Forks AFB. The Steen and Eielson substations distribute power on the base. Over 72 percent of the base's power lines are buried. Eighty percent of the distribution transformers are loaded at less than 30 percent of their capacity, with over 99 percent of the transformers loaded at less than 60 percent during periods of peak demand. This leaves adequate electrical power capacity for future base expansion (Grand Forks AFB 2006a). Grand Forks AFB's electric system capacity is approximately 275,940 MWH per year or 756 MWH per day. Grand Forks AFB averages approximately 3,831 MWH per month or 127.7 MWH per day, with usage remaining fairly constant throughout the year.

3.3.8.5 Natural Gas System

Natural gas is supplied by XCEL Energy. Capacity and supply are sufficient for current and future mission requirements (Grand Forks AFB 2006a). The current Grand Forks AFB natural gas capacity is 2.3 million cubic feet (MMcf) per year. The current natural gas demand at Grand Forks AFB is approximately 11 percent of the base capacity.

3.3.8.6 Solid Waste Management

Most of the municipal solid waste and C&D waste generated at Grand Forks AFB is collected and transported off base by a local qualified contractor (Grand Forks AFB 2008a). This waste is currently disposed of at the Grand Forks Municipal Landfill (Permit No. 0347), which is located approximately 12 miles from the base. The landfill has a permitted capacity until 2014 at the current rate of up to 350 tons of waste per day (NDDH 2009).

Grand Forks AFB has a Qualified Recycling Program and implements mandatory recycling of nonhazardous solid waste from military family housing, dormitories, industrial shops, offices, tenants, and contractors. Recyclable materials are collected and transported by a contractor to a facility off of base property (Grand Forks AFB 2010b).

3.3.8.7 Transportation

Regional access to Grand Forks AFB is provided by U.S. 2, which extends parallel to the base along the length of its southern boundary. The nearest interstate highway is I-29. I-29 is the major north-south highway corridor along the North Dakota-Minnesota border and is less than 10 miles east of the base. Figure 2-11 shows the primary routes and regional transportation network in the vicinity of Grand Forks AFB. U.S. 2 is a four-lane divided highway that enters North Dakota from the east at the City of Grand Forks and continues west to the North Dakota-Montana border. Where U.S. 2 passes to the south of Grand Forks AFB, the average daily traffic count was 4,990 vehicles per day, 1,225 of which were commercial vehicles, in 2012 (NDDOT 2013). County Road 3 and Eielson Street provide access to Grand Forks AFB from U.S. 2.

The Burlington Northern Santa Fe Railway operates the closest rail line to Grand Forks AFB – the Grand Forks-Surrey line of the Devils Lake Subdivision, which runs just to the south of the

base, through the City of Emerado (NDDOT 2007). Amtrak provides regional passenger rail service by way of the Empire Builder line, with stops in Grand Forks and Devils Lake (75 miles west of Grand Forks AFB). Jefferson Bus Lines offers regional service with stops throughout the Upper Midwest and connects Grand Forks with other cities within North Dakota. Commercial airline service is available at Grand Forks International Airport, approximately 13 miles from the base, with access to three national and regional carriers.

3.3.8.7.1 Gate Access

There are two entry gates to Grand Forks AFB. The primary entrance is the Main Gate located on Steen Boulevard off of County Road 3. The Commercial Gate is a secondary entrance on the southern edge of the base. The Commercial Gate connects U.S. Highway 2 to Eielson Street. The Main Gate is open 24 hours a day and the Commercial Gate is open on a limited basis (Grand Forks AFB 2010b).

3.3.8.7.2 On-Base Traffic Circulation

The primary roadways on Grand Forks AFB are Steen Boulevard, J Street, and Eielson Street. Steen Boulevard is the center of the base roadway system. There are no on-base traffic circulation issues, and the road network is sufficient to accommodate the KC-46A MOB 1 scenario.

3.3.9 Hazardous Materials and Waste

3.3.9.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Grand Forks AFB are managed in accordance with AFI 32-7086, "Hazardous Materials Management," and controlled through the base HAZMART. This process provides centralized management of the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials. The HAZMART process includes review and approval by USAF personnel to ensure users are aware of exposure and safety risks. P2 measures are likely to minimize chemical exposure to employees, reduce potential environmental impacts, and reduce costs for material purchasing and waste disposal.

3.3.9.1.1 Aboveground and Underground Storage Tanks

Two bulk JP-8 fuel storage areas have a combined capacity of approximately 3.2 million gallons. The main bulk fuel storage facility is on the southern side of the base and serves as the main receiving point for JP-8. This facility supplies fuel to the ramp along the flightline. The other bulk fuel facility is on the west side of the base and supplies fuel to the Charlie Ramp. Other ASTs and USTs on the base are used to store gasoline, diesel, used oil, deicing fluid, ethanol fuel, and hydraulic oil.

All of the tanks at Grand Forks AFB are managed according to the base SPCC Plan (Grand Forks AFB 2009a), which addresses storage locations on base and proper handling procedures for all hazardous materials to minimize the potential for spills and releases. Spill response training, procedures, equipment, and notification procedures are further detailed in the FRP (PCCI 2004). The CEMP addresses roles, responsibilities, and response actions for all major accidents, including major spills (Grand Forks AFB 2011c). Since the departure of the KC-135 mission at Grand Forks AFB, usage of JP-8 has substantially decreased. In 2010, Grand Forks AFB used approximately 5 million gallons of JP-8; in 2012, the base used

approximately 583,000 gallons. JP-8 is delivered to the flightline by two Type III hydrant systems to 31 hydrant outlets in four rows on Charlie Ramp or by four R-11 tanker trucks.

3.3.9.1.2 Toxic Substances

The Asbestos Management Plan provides guidance for the identification of ACMs, the management of asbestos, and the prevention of asbestos exposure to facility occupants and maintenance personnel (Grand Forks AFB 2005). Additionally, the Asbestos Operating Plan assigns responsibilities and describes procedures for handling ACM (Grand Forks AFB 2008b). A base-wide asbestos survey was completed in 1994 and identified ACM at some facilities on base. Federal and state regulations require that all affected parts of a facility being renovated or demolished must be inspected by a state-certified inspector for the presence of ACM prior to beginning a renovation or demolition project. All regulated ACM that would be disturbed as part of a renovation or demolition activity must be properly removed by state-certified individuals and properly disposed of in an approved landfill. A Notification of Demolition and Renovation Form must be submitted to the NDDH 10 days prior to beginning any demolition activity, whether or not asbestos is present (NDDH 2013a).

Grand Forks AFB assumes the presence of LBP in any building constructed before 1980 (Grand Forks AFB 2003). As a policy, contractors working on base are advised of the presence of LBP or the potential for LBP and are responsible for safeguarding their employees according to OSHA requirements. Buildings being demolished typically do not require LBP abatement, unless the LBP would be disturbed by sanding, scraping, dry-cutting, or torching. The Grand Forks AFB LBP Management Plan provides guidance on the management of LBP (Grand Forks AFB 2003). The base complies with all Federal, state, and local requirements regarding LBP, LBP activities, and LBP hazards.

None of the transformers at Grand Forks AFB have PCB-containing oil (Grand Forks AFB 2009a).

3.3.9.2 Hazardous Waste Management

Grand Forks AFB is classified as a small-quantity generator. Typical hazardous wastes generated during operations and maintenance activities include aerosol cans, antifreeze and antifreeze filters, batteries, fuel and oil filters, fluorescent lamps, oil-water separator sludge, paint/primer related wastes, parts washer wastes, plastic/glass bead blaster filter, rags with oil or fuel, and used oil and fuels.

Hazardous wastes at Grand Forks AFB are managed in accordance with the Hazardous Waste Management Plan (Grand Forks AFB 2012c). This plan presents key activities associated with implementing a hazardous waste management program as required by Federal and state laws and regulations. In 2012, the base generated approximately 1,910 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities. Grand Forks AFB also operates a land treatment facility (IT-183) for the remediation of petroleum-contaminated soil in the southwestern portion of the base.

3.3.9.3 Environmental Restoration Program

There are seven ERP sites at Grand Forks AFB that are administered in accordance with the Management Action Plan (Grand Forks AFB 2006b). Environmental response actions are planned and executed under the ERP in a manner consistent with CERCLA and other applicable laws.

3.3.10 Socioeconomics

Socioeconomics refers to features or characteristics of the social and economic environment. The main concern for socioeconomic resources is the change in personnel at Grand Forks AFB associated with the KC-46A MOB 1 scenario that could potentially impact population, employment, earnings, housing, education, and public services. Grand Forks County, North Dakota, is the ROI for this analysis.

3.3.10.1 Baseline Conditions

3.3.10.1.1 Population

In 2010, the population of Grand Forks County totaled 66,861 persons (U.S. Census 2010g). Between 2000 and 2010, the ROI population increased at an average annual rate of 0.1 percent, with a total increase of approximately 752 persons (U.S. Census 2000g, 2010g). The City of Grand Forks, the most populated city in Grand Forks County and the county seat, experienced an annual 0.7 percent increase over the 10-year period (U.S. Census 2000h, 2010h). The North Dakota population totaled 672,591 persons in 2010 and increased at an average annual growth rate of 0.5 percent between 2000 and 2010 (U.S. Census 2000i, 2010i) (see Table 3-25).

In 2012, Grand Forks AFB had a total work force of 2,513 personnel, which included 1,531 military personnel (full-time), 303 DoD civilians, and 679 other base personnel. In addition, there were an estimated 1,614 military dependents and family members associated with the full-time military personnel (Grand Forks AFB 2012a).

Table 3-25. Population for the City of Grand Forks, Grand Forks County, and North Dakota

Location	2000	2010	Annual Percent Change (2000–2010)
City of Grand Forks	49,321	52,838	0.7%
Grand Forks County	66,109	66,861	0.1%
North Dakota	642,200	672,591	0.5%

Source: U.S. Census 2000g, 2000h, 2000i, 2010g, 2010h, 2010i.

3.3.10.1.2 Economic Activity (Employment and Earnings)

In 2011, the most recent data available, employment in Grand Forks County totaled 51,566 jobs (BEA 2012). The largest employment sectors in Grand Forks County were government (23.4 percent), followed by health care and social assistance (14.2 percent) and retail trade (14.1 percent) (BEA 2012). Construction accounted for 5.3 percent of total employment. In 2012, the unemployment rate in Grand Forks County was 3.7 percent (BLS 2013a). The county unemployment rate was higher than the state (3.1 percent) but lower than the Nation (8.1 percent) (BLS 2013b). As of April 2013, the monthly unemployment rate (not seasonally adjusted) for Grand Forks County was estimated at 3.8 percent (BLS 2013c).

Grand Forks AFB is an important contributor to the Grand Forks County economy through employment of military and civilian personnel and expenditures for goods and services. The total economic impact of the base on the surrounding communities between October 2011 and September 2012 was $203,164,779. The payroll for military, DoD civilians, and other base personnel was $99,201,416. An estimated $9,320,859 worth of MILCON also occurred in 2012 (Grand Forks AFB 2012a).

3.3.10.1.3 Housing

Table 3-26 presents census-derived housing data for the City of Grand Forks and Grand Forks County. In 2010, Grand Forks County had 29,344 total housing units, of which 6.6 percent of the units (1,927) were vacant (U.S. Census 2010g). Approximately 80 percent of the total housing units in Grand Forks County are located in the City of Grand Forks. Of the total housing units in the City of Grand Forks, 5 percent (1,189) were vacant at the time of the 2010 Census (U.S. Census 2010h). Of the vacant units in the city, more than half (60 percent) were for rent, while nearly 43 percent of those vacant units in the county were available for rent.

Table 3-26. Housing Data for the City of Grand Forks and Grand Forks County

Location	Housing Units	Occupied	Vacant	For Rent
City of Grand Forks	23,449	22,260	1,189	711
Grand Forks County	29,344	27,417	1,927	835

Source: U.S. Census 2010g, 2010h.

There are three housing options available at Grand Forks AFB: government housing, unaccompanied housing, and housing in the local community. Currently, there are 576 housing units on base with an occupancy rate of 99.3 percent (USAF 2013f). Military family housing at Grand Forks AFB was privatized in August 2013.

There are five dormitories with a total of 412 dormitory units for unaccompanied Airmen in the rank of E-1 to E-4 with less than 3 years of service on Grand Forks AFB (USAF 2013f). Based on the 29 November 2012 Dormitory Master Plan and the FY 2015 Integrated Manpower Requirement Document, the requirement is 234 units, resulting in a surplus of 178 units (USAF 2013f). However, due to a recent increase in the number of unaccompanied Airmen during October 2012, the actual requirement the base is supporting is 326 enlisted, which leaves a surplus of 86 units. Housing in the local community is available for unaccompanied Airmen in the ranks of E-4 with 3 or more years of service.

3.3.10.1.4 Education

There are nine public school districts in Grand Forks County. The Grand Forks Public School District is the largest district, with 12 elementary schools, four middle schools, and two high schools. The district serves more than 7,000 students in Grand Forks and on Grand Forks AFB. The student-to-teacher ratios range from 9:1 to 16:1 (Grand Forks ECD 2012). In North Dakota, the recommendation for a prototypical public school is 15 students in kindergarten through third grade and 25 students in fourth grade and above (North Dakota DPI 2008).

There are two schools located on the base, Carl Ben Eielson Elementary (grades K–3) and Nathan Twining Elementary/Middle School (grades 4–8). Both are part of the Grand Forks Public School District. School-aged children in grades 9–12 who reside on base attend Grand Forks Central High School, located in Grand Forks (USAF 2012d).

3.3.10.1.5 Public Services

Public services in Grand Forks County include law enforcement, fire protection, emergency medical services, and medical services. The Grand Forks County Sheriff’s Office is responsible for the law enforcement segment of public safety within the county. In addition to the Sheriff’s Office, there are numerous law enforcement agencies in the area.

Fire protection is carried out by various rural and municipal fire departments throughout the county. Grand Forks staffs four strategically located fire stations with 57 firefighters (City of Grand Forks 2013). The closest fire station (Station 4) is located approximately 17 miles east of Grand Forks AFB. The Grand Forks County Emergency Management department provides an integrated emergency management system. Altru Health System is the major medical services provider in the Grand Forks region. The closest emergency room to the base is Altru Hospital, located in the City of Grand Forks.

3.3.10.1.6 Base Services

The 319th Medical Group provides dental and medical services to military personnel and their families on the base. The base clinic provides routine and acute care and serves a local patient population of more than 7,000 active-duty and retired members and their families.

Other base services include dining facilities, recreation and fitness centers, and youth and family services. Dining facilities include the Airey Dining Facility, which seats up to 228 customers at a time, cybercafé, snackbar, and a sports café/bar. Recreation facilities include a pool, golf course, Frisbee golf, bowling lanes, and a 135,000-square-foot fitness center. Youth and family services on base include a CDC, family child care, and a youth center (USAF 2013f).

3.3.11 Environmental Justice and the Protection of Children

Grand Forks County represents the region of comparison for evaluating disproportionate effects (in Chapter 4) on populations of concern for environmental justice and for children. Table 3-27 shows that the proportion of minority persons in Grand Forks County is similar to the State of North Dakota, but much lower than is typical in the Nation as a whole. Low-income persons compose a slightly higher proportion of the county's population than in the State of North Dakota and the Nation as a whole. Also, the proportion of children in the county population is slightly lower than found in the State of North Dakota and the Nation.

Table 3-27. Characterization of Environmental Justice Populations at Grand Forks AFB

Location	Total Population	Minority		Low-Income[a]	Youth	
		Number	Percent	Percent	Number	Percent
Grand Forks County	66,861	7,590	11.35%	16.70%	13,421	20.07%
North Dakota	672,591	74,584	11.09%	12.30%	149,871	22.28%
United States	308,745,538	111,927,986	36.25%	14.30%	74,181,467	24.03%

[a] 2007–2011 estimate; all other values based on 2010 census.
Source: U.S. Census 2010g, 2010i, 2012.

3.4 McCONNELL AIR FORCE BASE

This section of Chapter 3 describes the baseline conditions of the environmental resources anticipated to be affected by implementation of the KC-46A FTU or MOB 1 scenario at McConnell AFB and, when applicable, in areas surrounding the base. The baseline resource conditions are described to the level of detail necessary to support analysis of the potential impacts that could result from implementation of the KC-46A FTU or MOB 1 scenario at McConnell AFB.

3.4.1 Noise

Noise, which is defined as unwanted sound, has the potential to affect several resource areas evaluated in this Final EIS. Background information on the regulatory setting and methodology for noise is contained in Volume II, Appendix B, Sections B.1.2 and B.1.3.

3.4.1.1 Base-Affected Environment

The current mission at McConnell AFB is described in Section 2.4.4 and includes KC-135 aircraft. Table 3-28 shows noise levels of the KC-135 at different heights above the ground during landings and takeoffs. Aircraft flying at higher altitudes may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly lower noise levels than shown in Table 3-28. The noise levels in this table are presented as SELs in dB, which are the sum of sound energy during the noise event.

Table 3-28. Aircraft Noise Levels at McConnell AFB

Aircraft	Power Setting	SEL at Overflight Distance (in dB)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
KC-135	65% NF	100	95	90	84	75	67
Takeoff							
KC-135	90% NF	105	100	95	90	81	73

Note: Aircraft airspeed is 160 knots. Aircraft operate at various airspeeds in and around the airfield.
Key: Power Unit: NF – engine fan revolutions per minute
Source: NOISEMAP 7.2 Maximum Omega 10 Results.

Of the 38,618 annual operations conducted at McConnell AFB, 8 percent occur during the night between 10:00 P.M. and 7:00 A.M. Due to the potential for night noise to be particularly intrusive, noise events occurring during this time period are assessed a 10 dB penalty when calculating DNL.

The baseline noise contours shown on Figure 3-4 reflect the current level of operations at McConnell AFB and were calculated using NOISEMAP (Version 7.2). As a point of reference, Figure 3-4 also shows the 65 dB DNL noise contour published in the 2004 AICUZ report (USAF 2004). The changes in calculated noise levels between baseline conditions and the 2004 AICUZ report result from operations data updates and refinements to noise modeling algorithms. KC-135 operations have decreased since 2004, resulting in reduced noise levels. Baseline noise levels were calculated using algorithms that account for location-specific effects of local terrain (e.g., hills and valleys) and ground impedance (e.g., grass absorbs sound energy to a greater degree than water).

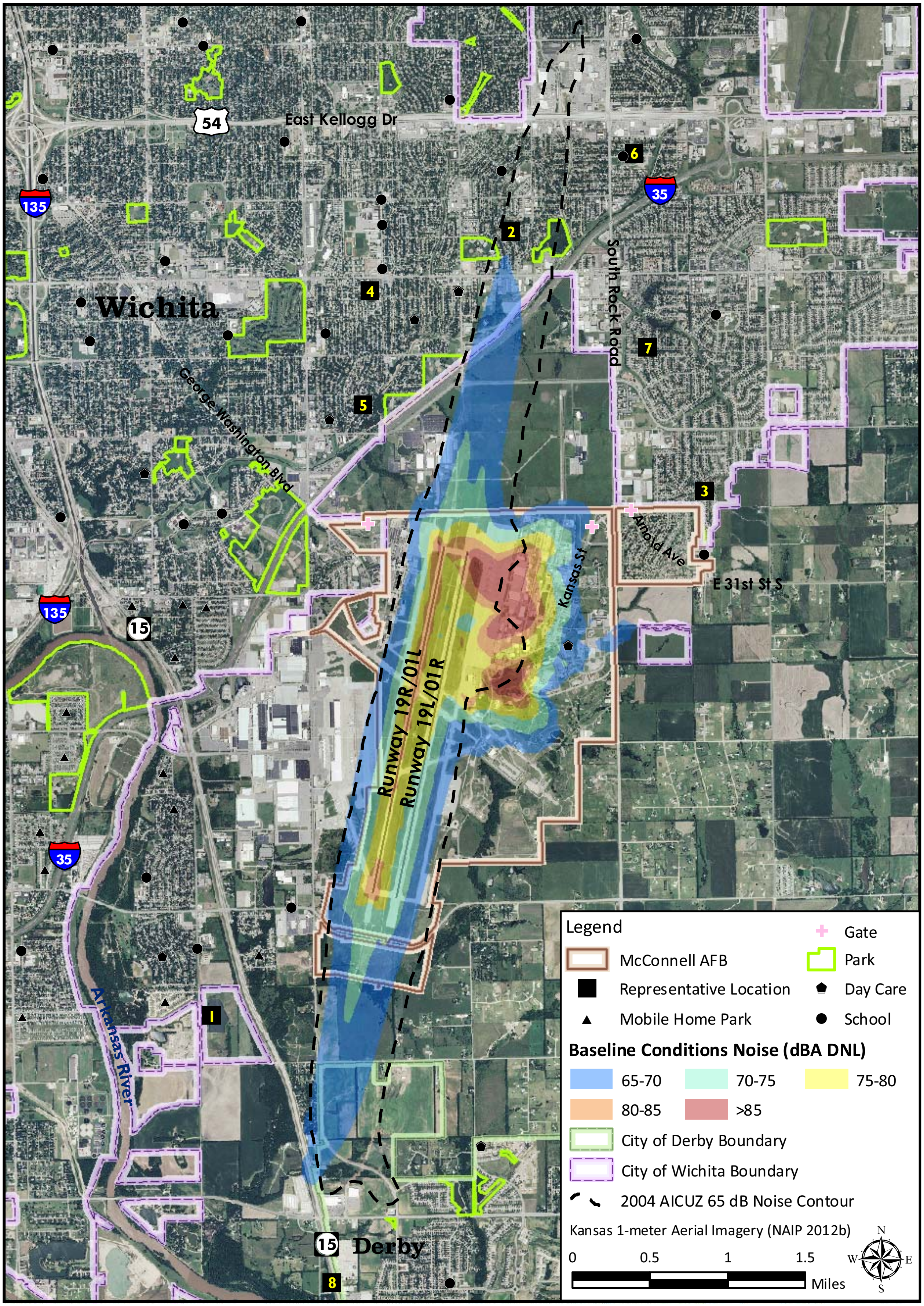

Figure 3-4. McConnell AFB Baseline Noise Contours

Table 3-29 shows the number of on- and off-base acres and estimated residents that are currently exposed to noise levels greater than 65 dB DNL. It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed, and this has been accepted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.4.7 and Volume II, Appendix C, Section C.1.3.1). On base, 46 buildings are affected by noise levels of 80 dB or greater. Per DoD policy, the 80 dB DNL noise contour is used to identify populations most at risk of potential hearing loss (USD 2009). If no residence or populated area is within the 80 dB DNL contour, then no further risk assessment is warranted. None of the affected buildings are residential. The risk of hearing loss among workers at McConnell AFB is managed according to DoD regulations for occupational noise exposure. OSHA and NIOSH occupational noise exposure regulations would continue to be enforced to protect employees of McConnell AFB.

Table 3-29. Population and Acreage Affected Under Noise Contours Near McConnell AFB, Baseline Conditions

Noise Level (dB DNL)	Baseline Conditions		
	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	213	650	438
70–74	1	74	418
75–79	0	0	455
80–84	0	0	198
≥85	0	0	128
Total	**214**	**724**	**1,637**

Note: Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Table 3-30 presents noise conditions at several representative locations in the area surrounding McConnell AFB. The representative locations do not denote a specific noise-sensitive receptor, but were instead established based on central points of U.S. Census subdivisions. The areas in the vicinity of the representative locations are expected to experience similar aircraft noise levels. Of the 8 locations studied, which are depicted on Figure 3-4, only one location experiences aircraft noise levels at or greater than 65 dB DNL. Departures and closed patterns of transient aircraft (e.g., F-16C, T-38C) are the operations that are major contributors to noise in the McConnell AFB vicinity. A few KC-135 closed pattern operations were also part of the top five SEL noise contributors. Table C-1-4 in Volume II, Appendix C, Attachment C-1, provides details regarding the major noise-contributing operations at each location under baseline conditions at McConnell AFB.

Table 3-30. McConnell AFB Representative Locations Under Baseline Conditions

Location ID	Baseline Conditions	
	DNL (dB)	Top 5 SELs (dB)[a]
1	52	83–94
2	65	95–108
3	54	80–89
4	52	81–95
5	55	85–96
6	53	85–98
7	52	82–102
8	61	91–102

[a] ‘Top 5 SELs’ refers to the range of loudest five event types experienced at the location (see Volume II, Appendix C, Attachment C-1).

Base flying procedures have been designed to minimize impacts on the surrounding community while maximizing operational capacity and flexibility. Lower-level closed pattern operations are not allowed to be conducted between 10:00 P.M. and 6:00 A.M. Transient aircraft are not permitted to conduct practice landings between 10:00 P.M. and 6:00 A.M., with the exception of transient KC-135 aircraft. Based KC-135 aircraft regularly use the airfield, and noise patterns are established (McConnell AFB 2006a). Noise complaints in the community around McConnell AFB are infrequent. Complaints range from general noise complaints to complaints of low-flying aircraft.

3.4.2 Air Quality

In Kansas, the Kansas Department of Health and Environment (KDHE) is responsible for enforcing air pollution regulations. The KDHE uses the NAAQS to regulate air quality within Kansas. Additional background information on the CAA and the NAAQS is contained in Volume II, Appendix B, Section B.2. Information on regional climate is contained in Volume II, Appendix D, Section D.4.

The KDHE Bureau of Air Quality enforces the NAAQS by monitoring state-wide air quality and developing rules to regulate and permit stationary sources of air emissions. The Kansas Air Quality Regulations are found in Article 19, Agency 28, of the *Kansas Administrative Regulations* (KDHE 2013a). McConnell AFB currently operates under a Class II Permit-By-Rule Operating Permit, under *Kansas Administrative Regulation* 28-19-564.

3.4.2.1 Region of Influence and Existing Air Quality

Air emissions produced from construction and operation of the KC-46A aircraft at McConnell AFB would mainly affect air quality within the greater Wichita area and Sedgwick County. KC-46A operations associated with the FTU scenario would also affect air quality in the immediate vicinity of auxiliary airfields and along aircraft flight routes between these locations. Currently, Sedgwick County and the areas surrounding the auxiliary airfields proposed for use by the FTU are in attainment of the NAAQS for all pollutants. However, air monitoring data show that maximum O_3 levels recorded in the Wichita area from 2010 to 2012 are slightly higher than the national standard (KDHE 2013b). Prescribed burns and wildfires within and outside of Kansas that transported smoke and O_3 precursor emissions into the area were contributors to some of these high O_3 readings (USEPA 2012). As a result, the USEPA excluded these “exceptional events” as O_3 exceedance days in the area. Whether the Wichita area remains in attainment of the O_3 standard will depend on future air quality levels, in addition to the outcome of the current effort of the USEPA to review the appropriateness of the existing national O_3 standard.

3.4.2.2 Regional Air Emissions

Table 3-31 summarizes estimates of the annual emissions generated by Sedgwick County in CY 2008 (USEPA 2013a). The majority of emissions within the region occur from (1) on-road and nonroad mobile sources (VOCs, CO, and NO_x), (2) solvent/surface coating usages (VOCs), and (3) fugitive dust from unpaved roads and construction activities (PM_{10}/$PM_{2.5}$).

Table 3-31. Annual Emissions for Sedgwick County, Kansas, CY 2008

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Stationary Sources	19,509	9,576	4,984	817	42,473	6,228	34,902
Mobile Sources	8,223	93,851	15,510	199	819	646	3,190,452
Total	**27,732**	**103,426**	**20,495**	**1,016**	**43,292**	**6,874**	**3,225,354**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons
Source: USEPA 2013a.

3.4.2.3 McConnell AFB Emissions

Operational emissions due to existing operations at McConnell AFB occur from (1) aircraft operations and engine maintenance/testing, (2) AGE, (3) onsite GMVs and POVs, (4) offsite POV commutes, (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and area sources. Table 3-32 summarizes the most recent estimate of annual operational emissions that occurred at McConnell AFB (CY 2012). Data needed to calculate existing emissions at McConnell AFB were obtained from (1) the project noise analyses for aircraft operations, (2) activity data collected for 2012 operations, (3) a statement of 2012 stationary source emissions for McConnell AFB (McConnell AFB 2013a), and (4) the 2012 Fairchild AFB emissions inventory for AGE and mobile fuel operations. The analysis used AGE and mobile fuel operations data from Fairchild AFB, as McConnell AFB is not required to collect these data as part of their air permitting process. Emission factors used to calculate combustive emissions for the KC-135 aircraft were based on emissions data developed by CFM International for the CFM56-2B1 engine (ICAO 2013a). The data in Table 3-32 also are used to estimate non-aircraft source emissions for future project scenarios at McConnell AFB. Volume II, Appendix D, Section D.4, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from existing sources at McConnell AFB.

Table 3-32. Annual Emissions from Existing Operations at McConnell AFB, CY 2012

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-135 Aircraft Operations	10.89	176.49	291.09	27.06	1.47	1.47	75,389
Transient Aircraft	11.89	52.46	97.63	8.46	6.72	6.72	20,676
On-Wing Aircraft Engine Testing – KC-135	2.03	27.92	44.75	3.56	0.19	0.19	9,907
Aerospace Ground Support Equipment	1.67	11.98	14.08	0.40	1.86	1.71	1,708
GMVs/Nonroad Equipment	1.67	9.13	22.09	0.58	1.81	1.06	2,659
Privately Owned Vehicles – On Base	0.24	8.49	1.64	0.02	0.08	0.04	1,258
Privately Owned Vehicles – Off Base	1.40	41.47	10.02	0.09	0.75	0.43	6,052
Mobile Fuel Transfer Operations	0.11	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	[a]	7.96	11.94	0.27	[a]	[a]	[a]
Total Emissions	**40.79**	**335.90**	**493.25**	**40.43**	**12.89**	**11.63**	**117,551**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

3.4.3 Safety

3.4.3.1 Flight Safety

McConnell AFB has had only two Class B mishaps and zero Class A mishaps on or around the airfield in the last 10 years. Both of the Class B mishaps were engine component failures. Neither was due to conditions around/on the airfield nor related to BASH (USAF 2013g). Since 1965, KC-135 aircraft at McConnell AFB have been involved in two Class A mishaps (Hoctor 2009).

The KC-135 and the future KC-46A have the ability to jettison fuel during emergency situations. Data on historical KC-135 operations show that slightly less than two sorties per thousand resulted in a release of fuel (AMC 2013). The ability to land the KC-46A at a much higher weight than the KC-135 would be expected to reduce the frequency of fuel releases for the KC-46A. As such, it is expected that KC-46A sorties would experience a lower frequency of fuel releases.

It is the policy of the USAF MAJCOMs to follow AFIs or supplement those AFIs that have been established. These policies require that pilots avoid fuel jettison, unless safety of flight dictates immediate jettison. For example, AMC policy, which covers all USAF tanker assets, requires that, whenever possible, any fuel released from an aircraft must occur above 20,000 feet AGL (AMC 2004, 2012). This policy is designed to minimize potential impacts of fuel jettison events.

The main environmental concern from fuel released from an aircraft is the deposition of fuel onto the ground and/or surface waters and subsequent negative impact on human health or natural resources. The results of a definitive study on the fate of jettisoned fuel from large USAF aircraft (e.g., KC-135) (Deepti 2003) were used to identify a reasonably conservative ground-level fuel deposition value for the KC-46A. This study used the Fuel Jettison Simulation model developed by the USAF to estimate the ground deposition of fuel from jettison events (Teske and Curbishley 2000). This maximum ground-level fuel deposition value identified for the KC-46A would result in effects that are well below known natural resource and human health thresholds for jet fuel. Therefore, the maximum fuel deposition value expected from the KC-46A would not produce substantial impacts on human health or natural resources. In view of this, no further analysis is included in this section.

3.4.3.1.1 Wildlife Strike Hazard at McConnell AFB and Vicinity

Bird-aircraft strikes (as well as other animal strikes) on the runway and during takeoffs and landings have been documented as an ongoing hazard in the BASH program. The base is located on a migration flyway for Canadian geese, as well as other migratory birds. The base has a BASH program to help minimize the potential for migratory birds to congregate on base. Records from 2005 to 2009 show numerous bird strikes ranging from 114 in 2006 to 33 in 2009 (USAF 2013g).

The wildlife that have been identified to pose the greatest risk of damaging aircraft are Canada geese, various duck species, common nighthawks, gulls, pigeons, starlings, deer, and raptors. The BASH Plan provides instructions to identify the species of bird whenever a strike occurs to direct bird reduction methods.

The BASH Plan identifies several approaches to reduce bird/wildlife-aircraft strike hazards, including grounds maintenance, physical removal of the birds, and improving flight crew awareness. Flight Safety is primarily responsible for BASH monitoring and improvement and is required to abide by the BASH Plan (McConnell AFB 2012a).

As is the case at other bases, the BASH program is divided into two periods: Phase I and Phase II. For most operations, the procedures are the same. However, some restrictions may apply to Phase II. Phase II is identified as a period of higher bird activity based on data collected over many years. Phase II normally begins 1 September and ends 28 February.

3.4.3.2 Ground Safety

There are 370 acres of the CZ and 2 acres of APZ I within the base boundary. All of the land in the northern and southern APZs I and II is outside the base boundary and partially in the limits of the City of Wichita. The land in the Wichita City limits is zoned commercial and residential.

Land in the southern APZ I is in Sedgwick County and in the southern APZ II is partially in Sedgwick County and partially in the City of Derby. Each of McConnell AFB's CZs consists of an area 3,800 feet wide by 3,000 feet long. Each APZ I is 3,800 feet wide by 5,000 feet long, and each APZ II is 3,800 feet wide by 7,000 feet long.

Land in the northern CZ is partially within the base boundary, with the remainder zoned as industrial land in Sedgwick County. Land in the southern CZ is within the base boundary, with the exception of 47th Street.

As indicated in Section 3.4.7, Land Use, the majority of the land in the northern APZ I consists of industrial and open-space/low-density use in Sedgwick County. The southern APZ I is entirely in Sedgwick County and land use is primarily open-space/low-density. The northern APZ II is almost entirely in the City of Wichita, and land use is primarily residential, along with smaller parcels of commercial land use south of Harry Street. Land within the southern APZ II consists of open-space/low-density and residential use in Sedgwick County, and commercial and open-space/low-density use in the City of Derby.

Capability for fire response is located on base and in the local communities. The base fire department is party to mutual-aid support agreements with the nearby communities.

3.4.4 Soils and Water

3.4.4.1 Soil Resources

McConnell AFB is located in the Arkansas River Lowlands section of the Central Lowland physiographic region. Soil underlying the base is primarily of the Urban land–Irwin and of the Urban land–Tabler associations (NRCS 2012). Most of the native soils on base have been disturbed and as a result, soils have been intermixed with urbanized land features, making the original soils unidentifiable (HQ AMC 2012; McConnell AFB 2004a). The soil of these associations is deep and moderately well-drained, with high run-off and slow permeability.

3.4.4.2 Water Resources

3.4.4.2.1 Surface Water

McConnell AFB is located in the Lower Arkansas River watershed (HQ AMC 2012). Major surface water features located in the vicinity of McConnell AFB include the Arkansas River, located approximately 3 miles southwest of the base, and two tributaries of the Arkansas River, McConnell Creek and Gypsum Creek (McConnell AFB 2004a; USAF 2009). Surface water features on base include small feeder tributaries of the Arkansas River and several small ponds, which are used for irrigation or stormwater control (McConnell AFB 2004a). The majority of surface drainage on the base flows into McConnell Creek, which later discharges into the Arkansas River southwest of the base. The remaining drainage is captured by Gypsum Creek, which also discharges to the Arkansas River (HQ AMC 2012). The Arkansas River at Wichita is identified on the Clean Water Act (CWA) 303(d) list as impaired for its lead, phosphorus, biology, chloride, and fecal coliform levels (KDHE 2012).

Underground pipes, culverts, and natural channels collect stormwater run-off from the base (McConnell AFB 2004a). Run-off from McConnell AFB is conveyed off base via drainage swales, storm sewers, and drainage channels through 1 of 13 outfalls.

McConnell Creek runs across the base in a northeast to southwest direction and receives drainage from the largest portion of the base through 1 of the 13 outfalls. The gates of the main channel

and bypass control structures near Sedgwick Street can be closed in the event of a spill (USAF 2009). The western portion of the base discharges into Gypsum Creek via multiple drainage channels. McConnell Creek has been classified as a jurisdictional water of the United States (a waterway that falls within the Section 404 jurisdiction of the U.S. Army Corps of Engineers [USACE]).

To manage stormwater run-off and to protect the quality of surface water on base and in the vicinity of the base, McConnell AFB has been issued two different stormwater permits. The base housing area is covered under a municipal storm sewers permit, and the remainder of the base is covered by an industrial NPDES permit. The NPDES permit requires stormwater outfall sampling at different frequencies and in different watersheds, depending on the activities being conducted on the base. For example, deicing occurs along a taxiway in Drainage Area 1-19. While all outfalls are sampled on a regular basis, Outfall 19 is sampled at an increased frequency during periods of deicing activities. Deicing is conducted with a propylene glycol solution.

During the past 3 years all deicing has occurred at Taxiway Alpha in Drainage Area 1-19. The deicing system at this location consists of three deicing pads and associated infrastructure. Stormwater runoff from the deicing pads that occurs during the winter months is collected and temporarily stored in an underground holding tank. The effluent collected from this tank is gradually pumped from the holding tank through a wet well for release to the sanitary sewer system. During the summer months, a diversion valve in the system allows runoff from the Taxiway Alpha stormwater system to be conveyed to Outfall 19.

Past sampling results at the outfall from Drainage Area 1-19 have indicated elevated biological oxygen demand (BOD) levels, which could result from deicing chemicals. These levels have been reported to the KDHE in accordance with permit requirements. The base, in coordination with the KDHE, has implemented best management practices to reduce BOD levels in surface water at this outfall. These have included monitoring, flushing of the system prior to opening the diversion valve, replacement of the diversion valves, and a discontinued effort to conduct deicing on a parking apron. The base will continue to monitor and report BOD exceedances, should they occur from this outfall. The NPDES permit also requires periodic visual monitoring to ensure that discharges are in compliance with permit requirements (KDHE 2008). The current NPDES permit expired as of 31 December 2012. However, the renewal has been submitted and the base is permitted to continue to discharge under this permit until further notice (Pettus 2013a).

3.4.4.2.2 Groundwater

A shallow, unconfined aquifer and a deeper, water-bearing aquifer occur below McConnell AFB. The shallow aquifer is between 1 and 22 feet below ground surface and generally flows in accordance to the local topography toward local surface water drainage features. Due to insufficient data, the direction of flow of the deep aquifer is undetermined at this time (McConnell AFB 2007). Groundwater on base is not used as a source of potable water.

3.4.4.2.3 Floodplains

Preliminary mapping shows that approximately 250 acres of the base are located within the 100-year floodplain. The areas located within the 100-year floodplain are along McConnell Creek and several of its intermittent tributaries that cross the base from northeast to southwest (HQ AMC 2012).

3.4.5 Biological Resources

3.4.5.1 Vegetation

Tall and mixed grass prairie historically dominated the land associated with and surrounding McConnell AFB (McConnell AFB 2004a). Agriculture dominated the area prior to construction of the original city airport. Subsequently, much of the natural vegetative community in the vicinity of the base has been altered or eliminated by agricultural activities and urban development.

Nearly 90 percent of McConnell AFB is improved or semi-improved habitat (McConnell AFB 2004a). Vegetative cover within the improved areas typically includes mowed lawns and select tree and shrub landscaping, mostly around buildings and along major streets. Semi-improved areas are also largely mowed grass areas with scattered trees. The area around the airfield consists primarily of grasses that are periodically mowed in accordance with BASH requirements.

Most unimproved areas on the base are disturbed sites with opportunistic herbaceous growth, old agricultural fields that have lain fallow for many years, or wooded riparian corridors (McConnell AFB 2004a). Most of the unimproved land is found in the southern half of the base, except for a small area east of the housing area. The area of the base south of 47th Street was leased for grazing in the past. Although grazing may partially simulate the disturbance of fire, some invasion by woody species and opportunistic herbaceous plants still occurs. The area is not currently leased for grazing but could be in the future.

3.4.5.2 Wildlife

Information on wildlife occurring on McConnell AFB is provided in the INRMP (McConnell AFB 2004a) and by the McConnell AFB Natural Resource Manager. Wildlife habitat is limited on McConnell AFB due to the extensive development. White-tailed deer and coyotes are the most common large mammals, and the eastern cottontail rabbit, opossum (*Didelphis virginiana*), and raccoon (*Procyon lotor*) are the most common small mammals. Although no amphibians or reptiles have been identified on McConnell AFB, a variety are known to occur in Sedgwick County, the most common of which are the western chorus frog (*Pseudacris triseriata*), bullfrog, and plains leopard frog (*Rana blairi*).

McConnell AFB is located within the Central Flyway (USFWS 2013a), which is a bird migration corridor generally designated for waterfowl and managed by state governments and the USFWS. Therefore, a large number of geese and ducks may occur in the general region during migration seasons.

3.4.5.3 Special-Status Species

No known Federal or state threatened or endangered species are known to occur at McConnell AFB. There is no critical habitat known to occur on base (USFWS 2013c). Although no special-status species are known to occur at McConnell AFB, 11 species have the potential to occur in Sedgwick County, Kansas (see Table 3-33). Many varieties of birds protected under the Migratory Bird Treaty Act occur as residents or migrants near McConnell AFB.

Table 3-33. Special-Status Species that Could Occur at McConnell AFB

Common Name	Scientific Name	Status		Occurrence at McConnell AFB
		Federal[a]	State[b]	
Birds				
Eskimo curlew	*Numenius borealis*	MBTA	SE	No
Interior least tern	*Sterna antillarum*	FE, MBTA	SE	No
Peregrine falcon	*Falco peregrinus*	MBTA	SE	No
Piping plover	*Charadrius melodus*	MBTA	SE	No
Snowy plover	*Charadrius alexandrinus*	MBTA	ST	No
Whooping crane	*Grus americana*	FE, MBTA	SE	No
Fish				
Arkansas darter	*Etheostoma cragini*	FC	ST	No
Arkansas River shiner	*Etheostama cragini*	-	SE	No
Arkansas River speckled chub	*Macrhybopsis tetranema*	-	SE	No
Silver chub	*Macrhybopsis storeriana*	-	SE	No
Mammals				
Eastern spotted skunk	*Spilogale putorius*	-	ST	No

[a] U.S. Fish and Wildlife Service
[b] Kansas Department of Wildlife, Parks and Tourism
Key: FC – candidate for Federal listing; FE – listed as endangered under the Endangered Species Act; MBTA – protected under the Migratory Bird Treaty Act; SE – state-listed as endangered; ST – state-listed as threatened
Source: KDWPT 2005; McConnell AFB 2004a; USFWS 2013b.

3.4.5.4 Wetlands

An onsite investigation performed in April 2000 identified a total of 14.8 acres of wetlands on base, including 3.04 acres of palustrine forested wetlands and 11.76 acres of palustrine emergent wetlands (McConnell AFB 2004a). Additionally, 6.33 miles of McConnell Creek, streams, and ditches on base exhibited wetland characteristics.

3.4.6 Cultural Resources

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources.

3.4.6.1 Architectural

All buildings and structures with the potential to be considered eligible for listing on the NRHP have been evaluated at McConnell AFB. In 1995, all buildings constructed prior to 1956 were evaluated (McConnell AFB 2004b). In 1996, the buildings on the base constructed between 1945 and 1989 were evaluated as part of a larger Cold War study that evaluated 27 bases and associated ranges around the country (USAF 1996). Additional architectural reviews have occurred during periodic Integrated Cultural Resource Management Plan updates. In 2011, McConnell AFB conducted a Section 110 inventory that examined 81 buildings and structures. McConnell AFB has determined that five buildings and one structure are eligible for the NRHP: Hangars 9, 1106, and 1107; Buildings 1218 and 1219; and the paved flightline (McConnell AFB 2004b; Rosin Preservation 2011). The Kansas SHPO has concurred with eligibility determinations for Hangar 9 and Buildings 1218 and 1219, and McConnell AFB is continuing to consult regarding Hangars 1106 and 1107 and the paved flightline (see Volume II, Appendix A, Section A.4.4). No Section 106 consultation is required for housing units covered by program comments (e.g., Department of the Air Force Program Comment for Capehart and Wherry Era Housing and Associated Structures and Landscape Features [1949–1962] [70 *Federal Register* [FR] 66959]).

3.4.6.2 Archaeological

Three archaeological surveys have been conducted on McConnell AFB since 1978. The entire base has been surveyed for archaeological resources, resulting in the identification and documentation of eight historic archaeological sites (McConnell AFB 2004b). There are no NRHP-eligible archaeological sites on McConnell AFB.

3.4.6.3 Traditional

McConnell AFB has identified 12 tribes typically consulted with as part of the NEPA and Section 106 processes. This list of tribes is contained in Table A-1 in Volume II, Appendix A, Section A.3. There are no known tribal sacred sites or properties of traditional religious and cultural importance in the vicinity of McConnell AFB.

3.4.7 Land Use

McConnell AFB is located in Sedgwick County, Kansas, on the outskirts of Wichita, Kansas. Land use surrounding McConnell AFB is a mixture of industrial, residential, commercial, and agricultural (or undeveloped areas). The downtown area of the City of Wichita is approximately 6 miles northwest of the base, and the City of Derby is located approximately 2 miles to the south.

3.4.7.1 Base

The 2011 McConnell AFB IDP describes the long-term development opportunities, current land uses, and the projected future direction for the base. As shown on Figure 3-4, the airfield area dominates the base. The airfield, including the taxiways and parking aprons on the east and west, extends to the northern and southern base boundary. On the east side of the airfield, industrial and aircraft maintenance areas are located directly adjacent to the airfield. Additional industrial use areas are situated in the southeast part of the base, surrounded by open space and outdoor recreation areas. The main cantonment area with the administrative, community services (medical, commercial), and housing (for both unaccompanied Airmen and families) is east of the industrial and aircraft areas. The west side of the airfield is developed with a similar arrangement on a smaller scale with aircraft maintenance and industrial-use areas along the airfield, a core built-up area with mission support activities, and open space areas interspersed between the base boundary and the built-up areas (McConnell AFB 2011a).

The 2011 IDP indicates that the current arrangement of land uses on McConnell AFB will continue into the future. Several future construction projects are identified in the IDP for the main cantonment area on the east side, including the development of the Krueger Recreation Area (McConnell AFB 2011b; USAF 2012e).

Figure 3-4 shows that much of the cantonment area is exposed to noise levels of 65 dB DNL and greater. These noise levels are not incompatible with most mission functions and land use. One child care facility is exposed to these higher noise levels. The family housing area on the northeast end of the base is outside the noise exposure zone.

3.4.7.2 Surrounding Areas

The City of Wichita extends to the McConnell AFB boundary to the north and west. Unincorporated areas of Sedgwick County surround the base to the north, east, south, and west (where the City of Wichita does not).

The area north of McConnell AFB and east (south) of I-35 has a mixture of open/vacant land, industrial and commercial land, with pockets of residential land. Land located east of the base is

primarily agricultural and less urbanized. Industry is the primary use immediately to the north and west of the base, notably with a Cessna aircraft facility on the northwest and the Cessna airfield/runway to the north. Several large aviation industrial facilities and warehouse/storage buildings are located directly to the west of the base. A small residential area next to the Kansas Aviation Museum is directly west-northwest of the base. Residential land use is also located east of U.S. Highway 15 immediately southwest of the base. Open/undeveloped land, intermixed with lower-density residential areas, is located to the east and southeast.

The future land use planning for the City of Derby is outlined in its 2006 Comprehensive Plan. There is a projected population increase of 10,000 to 15,000 new residents by 2030, with a likely expansion of single-family residential development to accommodate this increase. This is a potential encroachment concern for McConnell AFB. However, the City of Derby defines a McConnell AFB buffer zone for areas within the noise zones (Derby 2006).

The City of Wichita and Sedgwick County are in the process of updating their 1999 Comprehensive Plan. The two jurisdictions have adopted a unified zoning code that serves as the basis for land use approvals and permitting in the areas around McConnell AFB. The City of Wichita's 2030 future development planning anticipates urban growth in areas to the southeast of the base. Areas north and northwest of the base are zoned for a future industrial district.

About 720 acres around the base are currently exposed to noise levels of 65 dB DNL and greater. On the north side, the land is mostly vacant and industrial with a small extension north of I-35 into a residential area in Eastridge (a Wichita neighborhood with density greater than one dwelling unit per acre). A few homes and a church are within the noise envelope. To the south, the 65 dB DNL exposure envelope is mostly over agricultural land in the north end of the City of Derby. A residential area with a day care center and mobile home park are located immediately southwest of the airfield, but both are outside the current 65 dB DNL footprint and the APZs.

Flight tracks for landing and takeoff, and closed-pattern operations at the McConnell airfield have been designed to minimize noise exposure to the Cities of Wichita and Derby (HQ AMC 2011). Aircraft arrive and depart from both the northeast and southwest ends of the runway. The closed-pattern looping extends to the east of the airfield (away from the densely urban areas), and to the north, east, and south over portions of the City of Wichita and City of Derby. Most of the land under these patterns is outside the area affected by 65 dB DNL because of the altitude and engine power settings at which the aircraft are flown.

Compatibility planning within areas adjacent to and surrounding McConnell AFB is under the jurisdiction of and a priority for the City of Wichita and Sedgwick County. Efforts have resulted in the adoption of both Airport Overlay and Air Force Base Protection overlay districts. These districts regulate land use and building/structure heights to ensure compatible future development around McConnell AFB.

A JLUS was completed in 2005 to evaluate the mission at McConnell AFB and long-term health and safety of both the civilian and military communities (HQ AMC 2011). The JLUS was completed when urban development was expanding and encroaching on McConnell AFB. Several recommendations from the JLUS focused on managing land use in the surrounding areas, including establishment of real estate disclosures to new property owners, initiating land protection and acquisitions in the APZs (to limit development), and maintaining flexibility in future land use and rezoning around the base (McConnell AFB 2005).

McConnell AFB released an AICUZ study in 2004 and identified industrial, residential, commercial, open space/low-density, public/semi-public, and recreational land uses within the CZ,

APZ I, and APZ II north and south of the runway. The study noted that the CZs should be clear of structures and occupied facilities because of the level of accident potential.

As reported in the 2004 AICUZ study, the Cessna Aviation operation, located in the northern CZ, is identified as incompatible, but the southern CZ is within the base and has no incompatible uses. In both the northern APZ I and southern APZ I, there is a total of 50 acres of incompatible residential land use and 55 acres of industrial. In both the northern APZ II and southern APZ II, there is a total of 386 acres of incompatible residential land use, 6 acres of commercial, 33 acres of industrial, and 5 acres of public-quasi-public (including Clark Elementary School) land uses (USAF 2004).

Currently, the City of Wichita and Sedgwick County have a unified zoning code, which governs land use surrounding most of the base. The code includes an Air Force Base Protection overlay district that allows the Zoning Administrator to approve an adjustment to property development standards within the district (Wichita/Sedgwick 2009). The City of Derby is responsible for the zoning of land within its jurisdictional boundaries. Parcels within APZ I and II are zoned Restricted Commercial, Warehousing, and Limited Manufacturing (B-5), with a few parcels in APZ II zoned Single-Family Residential (R-1) (Derby 2013).

The City of Derby and Wichita/Sedgwick Comprehensive Plans show expansion of urban development to the areas south and east of McConnell AFB as part of their future plans (HQ AMC 2011). The AICUZ study has recommended that future planning efforts use USAF land use compatibility guidelines to evaluate existing and future land use proposals.

3.4.7.3 Auxiliary Airfields

As described in Section 2.4.4.2.4, as part of the FTU scenario at McConnell AFB, KC-46A aircrews would use CSM, Forbes Field (FOE), and Wichita Mid-Continent Airport (ICT) airfields, which are all currently being used by KC-135 aircrews. Since there would be no construction or other ground disturbance at these locations and noise is not projected to substantially increase as a result of KC-46A operations, the auxiliary airfields are not evaluated for this scenario at McConnell AFB.

3.4.8 Infrastructure

3.4.8.1 Potable Water System

Potable water is provided to McConnell AFB by the City of Wichita (Pettus 2013b). The city obtains water from Cheney Reservoir and the Equus Beds, which is a municipal well system. There is a 1 MG elevated storage tank on base. The condition of the base water supply system is considered adequate under current mission requirements (USAF 2012e). Water supply is reported to be sufficient. The base water system capacity is 2.6 MGD (Pettus 2013b). The average daily water use between 2011 and 2012 was 0.25 MGD. This is approximately 10 percent of base system capacity for average daily use. Peak water use occurs at McConnell AFB during the summer months; between 2011 and 2012, demand increased to 0.35 MGD, or 14 percent of the base system capacity (Pettus 2013b). During summer, high demands can diminish water pressure and volume (USAF 2012e).

3.4.8.2 Wastewater

The sanitary sewer system at McConnell AFB consists of a collection system only. All wastewater is discharged to the City of Wichita’s system, which consists of four wastewater treatment facilities (Lower Arkansas River, Four Mile Creek, Cowskin Creek, and Mid-Continent Water Quality

Reclamation facilities) with a total capacity of 62.4 MGD. McConnell AFB does not have a dedicated industrial wastewater system. The wastes generated at the industrial facilities on base are of the type that can be discharged into the sanitary sewer system. The overall condition of the sanitary sewer system is considered adequate for current mission requirements (USAF 2012e).

McConnell AFB's wastewater collection system capacity is 4.3 MGD (Pettus 2013b). Capacity and discharge amounts are reported to be sufficient. The average daily wastewater discharge between 2012 and 2013 was 0.27 MGD, or 7 percent of the base's wastewater collection system capacity. The reported peak wastewater discharge was 1.15 MGD between 2012 and 2013, or 27 percent of base capacity (Pettus 2013b).

3.4.8.3 Stormwater System

Both stormwater run-off and other surface drainage waters at McConnell AFB are managed by a series of underground pipes, culverts, and natural channels. The main area of the base and the flightline are contained within a single basin that drains into McConnell Creek. There are no stormwater detention/retention basins in the main area of the base (USAF 2012e). The family housing area has an enclosed drainage system that drains to the main base via an open channel. In general, however, the storm drainage system provides adequate collection and retention facilities to manage water from developed areas and prevent site erosion to meet current mission requirements. The details of the stormwater permit for McConnell AFB are described in Section 3.4.4.2.1. The permit does not, however, authorize stormwater discharges associated with construction activities. A separate Notice of Intent and SWPPP must be filed for all new construction activities that disturb 1 or more acre.

3.4.8.4 Electrical System

Westar Energy supplies and regulates electrical service to McConnell AFB (USAF 2012e). Westar Energy provides a billing capacity to the base of 10.8 megavolts, with a summer peak capacity of 10.9 megavolts (Pettus 2013b). Two circuits provide electricity through above-ground and below-ground distribution. The electrical system is considered adequate to meet current mission requirements with planned improvements to switchgear, streetlights, manholes, and underground utility lines (USAF 2011b). Capacity and supply are reported to be sufficient. The McConnell AFB electric system capacity is approximately 120,000 MWH per year, or 329 MWH per day (USAF 2011b). Actual average electric demand between 2011 and 2012 was 55,242 MWH. Average daily demand between 2011 and 2012 was 152 MWH, with peak demand of 194 MWH occurring during the summer months (Pettus 2013b). The electrical system at McConnell AFB is currently operating at 47 percent of overall capacity and, at peak demand, is operating at 60 percent of overall capacity (USAF 2012e).

3.4.8.5 Natural Gas System

Natural gas is supplied by Southern Star through a pipeline near the base. The base distribution system was upgraded in the 1990s, and approximately 97 percent of the system is constructed with PVC piping (USAF 2012e). Capacity and supply are reported to be sufficient. The maximum natural gas system capacity for the base is 2,829 Mcf per day. The natural gas system at McConnell AFB is considered adequate to meet current and future mission requirements (USAF 2012e). Between October 2011 and September 2012, the base consumed 159,287 Mcf, with an average daily use of 436 Mcf and peak daily demand in December of 1,018 Mcf (Pettus 2013b). The natural gas system at McConnell AFB is operating at 15 percent of overall average daily use capacity, and at peak demand is operating at 36 percent of overall capacity (USAF 2012f).

3.4.8.6 Solid Waste Management

All municipal solid waste and C&D waste generated at McConnell AFB is collected and transported off base by a local qualified contractor. Municipal solid waste is hauled off to either Plumb Thicket or Red Carpet Landfills, and C&D waste is sent to either Brooks or Construction, Demolition & Recycle (CDR) Landfills (USAF 2012e). With a disposal area of approximately 960 acres, Plumb Thicket is expected to provide more than 50 years of disposal capacity for the Greater Wichita and South Central Kansas area. The Red Carpet Landfill is approximately 406 acres and has a remaining projected life of more than 20 years. Medical and infectious wastes are transported off base for incineration. The base also maintains an active recycling program. Solid waste management at McConnell AFB is considered adequate to meet current mission requirements (USAF 2012e).

3.4.8.7 Transportation

The main highway access to McConnell AFB is provided by I-35. Figure 2-14 displays the regional transportation network in the vicinity of McConnell AFB. I-35, also known as the Kansas Turnpike from the Oklahoma border through Wichita and on to Emporia, is a toll highway that passes approximately 1 mile west of McConnell AFB and extends southwest and northeast around Wichita.

The main arterial roadways providing access to McConnell AFB include Rock Road, Arnold Boulevard, East 31st Street, and George Washington Boulevard. Rock Road is a four-lane highway that operates along the eastern border of the base in a north-south direction. It extends from East Kellogg Drive to the north through Wichita and south to the town of Mulvane.

Multiple rail carriers operate lines through the Wichita area, including the Burlington Northern Santa Fe, Union Pacific, and the Kansas and Omaha. The Wichita area does not currently have passenger rail service. The nearest passenger rail location is an Amtrak in Hutchinson, Kansas, approximately 60 miles northwest of McConnell AFB. Wichita Transit offers multiple bus routes throughout the city, including a stop within walking distance of the West Gate of McConnell AFB (Wichita Transit 2013). Regional bus service is provided by Greyhound with a stop in downtown Wichita. Commercial airline service is available at ICT, approximately 15 miles to the west, with access to six national and regional carriers.

3.4.8.7.1 Gate Access

McConnell AFB has three entry gates (USAF 2013h). The main base entrance (East Gate) is located on Kansas Street, off Rock Road. The East Gate is open year round. A comprehensive antiterrorism gate project was completed for the East Gate that included a connection to Salina Drive to support Kansas Air National Guard (KANG) traffic to and from the west base KANG area (McConnell AFB 2011a). The military family housing gate is located off Rock Road on Arnold Street. This housing gate is also open year round. An alternate housing gate is located off of East 31st Street and is only used when the main housing gate is closed. The West Gate is located on Salina Road near its intersection with South George Washington Boulevard. This gate is the primary entrance to the KANG complex located on the base and is the gate that all contractors and vendors must enter through to receive inspections and identification badges.

3.4.8.7.2 On-Base Traffic Circulation

The on-base roadway network at McConnell AFB consists of 19 miles of paved roads and 7.5 miles of administrative roads. Passing north of the airfield, Salina Drive is the primary

connector between the KANG facilities on the west side of the base and the rest of the base. Wichita Street is a looping road along the eastern boundary, providing access to the southern portion of the base, Krueger Recreational Area, and the Robert J. Dole Community Center. Kansas Street provides access to the administrative and support facilities with secondary roads providing access off Kansas Street. The roadways are considered to be in good condition and efficiently maintained (McConnell AFB 2011a).

3.4.9 Hazardous Materials and Waste

3.4.9.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at McConnell AFB are managed in accordance with the HMMP and controlled by the HAZMART through the P2 program (McConnell AFB 2009). This process provides centralized management of the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials. The HAZMART process includes review and approval by USAF personnel to ensure users are aware of exposure and safety risks. Proper hazardous materials management will minimize chemical exposure to employees, reduce potential environmental impacts, and reduce costs for material purchasing and waste disposal.

3.4.9.1.1 Aboveground and Underground Storage Tanks

Bulk JP-8 fuel is stored in eight ASTs at three fuel stand areas at McConnell AFB (McConnell AFB 2013b). The bulk storage capacity of the eight ASTs is 4,821,600 gallons. The estimated annual JP-8 fuel consumption is 13,319,618 gallons (McConnell AFB 2013b).

There are 10 active and regulated USTs on McConnell AFB: 4 gasoline, 3 diesel fuel, and 3 JP-8 fuel (Pettus 2013c). The 3 JP-8 fuel USTs are associated with Building 1171 (McConnell AFB 2013b). McConnell AFB has one currently active and non-regulated heating oil tank. This heating oil tank is associated with Building 1176 and is scheduled for removal in 2013 (Pettus 2013c). The McConnell AFB SPCC Plan addresses on-base storage locations and the proper handling procedures for petroleum, oils, and lubricants (including JP-8 used by the aircraft) to minimize and respond to potential spills and releases (McConnell AFB 2013b).

3.4.9.1.2 Toxic Substances

The Asbestos Management and Operating Plan (McConnell AFB 2003) provides guidance on the management of asbestos. An asbestos facility register is maintained by the CE squadron. The design of building alteration projects and requests for self-help projects are reviewed to determine if ACM is present in the proposed work area. For each project on base, ACM wastes are removed by the contractor and disposed of in accordance with state and Federal regulations at a permitted off-base landfill.

The LBP Management and Operations Plan (McConnell AFB 2006b) provides guidance on the management of LBP. As with ACM, the CE squadron maintains an LBP facility register to document the location of LBP on McConnell AFB. The design of building alteration projects and requests for self-help projects are reviewed to determine if lead-containing materials are present in the proposed work area. LBP testing is conducted in buildings constructed prior to 1978 (Pettus 2013d). For every project on McConnell AFB, LBP wastes are removed by the contractor and disposed of in accordance with state and Federal regulations at a permitted off-base landfill.

Electrical transformers at McConnell AFB reportedly do not contain PCBs (Pettus 2013d).

3.4.9.2 Hazardous Waste Management

McConnell AFB is classified as an LQG (USEPA 2011). Typical hazardous wastes generated during maintenance and operations activities include flammable solvents, contaminated fuels, paint/coatings, stripping chemicals, toxic metals, waste paint-related materials, waste generated under the Comprehensive Universal Waste Program, and other miscellaneous wastes (USAF 2012e).

Hazardous wastes are managed in accordance with the McConnell AFB Instruction 32-7002 (McConnell AFB 2012b). This instruction describes the control and management of hazardous wastes from the point the material becomes a hazardous waste to the point of disposal. In 2011, 36,000 pounds of hazardous wastes were generated at McConnell AFB (USEPA 2011).

3.4.9.3 Environmental Restoration Program

The restoration program at McConnell AFB started in 1984 with a base-wide inventory that identified 13 sites for further investigation. At this time, there are 19 solid waste management units associated with 4 ERP sites and 10 Compliance Restoration Program sites associated with 9 ERP sites (McConnell AFB 2013c). The sites include landfills, fire training areas, fuel and mercury spills, and storage tanks. Primary contaminants in soil and groundwater include fuels, waste solvents, and dissolved-phase fuels and solvents.

3.4.10 Socioeconomics

Socioeconomics refers to features or characteristics of the social and economic environment. The main concern for socioeconomic resources is the change in personnel at McConnell AFB associated with the KC-46A FTU or MOB 1 scenario that could potentially impact population, employment, earnings, housing, education, and public services. Sedgwick County, Kansas, is the ROI for this analysis.

3.4.10.1 Baseline Conditions

3.4.10.1.1 Population

In 2010, the population of Sedgwick County totaled 498,365 persons (U.S. Census 2010j). Between 2000 and 2010, the ROI population increased at an average annual rate of 1 percent, with a total increase of approximately 45,496 persons (U.S. Census 2000j, 2010j). The City of Wichita, the most populated city in Sedgwick County and the county seat, experienced an annual 1.1 percent increase over the 10-year period (U.S. Census 2000k, 2010k). The population in Kansas totaled 2,853,118 persons in 2010 and increased at an average annual growth rate of 0.6 between 2000 and 2010 (U.S. Census 2000l, 2010l) (see Table 3-34).

Table 3-34. Population for the City of Wichita, Sedgwick County, and Kansas

Location	2000	2010	Annual Percent Change (2000–2010)
City of Wichita	344,284	382,368	1.1%
Sedgwick County	452,869	498,365	1.0%
Kansas	2,688,418	2,853,118	0.6%

Source: U.S. Census 2000j, 2000k, 2000l, 2010j, 2010k, 2010l.

In 2012, McConnell AFB had a total work force of 4,358 personnel, which included 3,408 military personnel (full-time), 427 DoD civilians, and 523 other base personnel. In addition, there are an estimated 3,220 military dependents and family members associated with the full-time military personnel. Approximately 460 part-time Reservists are also located at

McConnell AFB, but because they are not considered full-time, they were not considered part of the work force for this analysis (McConnell AFB 2012c).

3.4.10.1.2 Economic Activity (Employment and Earnings)

In 2011, the most recent data available, employment in Sedgwick County totaled 306,765 jobs (BEA 2012). The largest employment sectors in Sedgwick County were manufacturing (15.3 percent), followed by government and government enterprises (11.8 percent) and health care and social assistance (11.7 percent) (BEA 2012). Construction accounted for 5.2 percent of total employment. In 2012, the unemployment rate in Sedgwick County was 6.9 percent (BLS 2013a). The county unemployment rate was higher than the state (5.7 percent) but lower than the Nation (8.1 percent) (BLS 2013b). As of April 2013, the monthly unemployment rate (not seasonally adjusted) for Sedgwick County was estimated at 6.1 percent (BLS 2013c).

McConnell AFB is an important contributor to the Sedgwick County economy through employment of military and civilian personnel and expenditures for goods and services. The total economic impact of the base on the surrounding communities within a 50-mile radius during FY 2012 was $619,100,000. The payroll for military, DoD civilians, and other base personnel was $513,495,032. An estimated $52,864,448 worth of construction expenditures also occurred on base in 2012 (McConnell AFB 2012c).

3.4.10.1.3 Housing

Table 3-35 presents census-derived housing data for the City of Wichita and Sedgwick County. In 2010, Sedgwick County had 211,593 total housing units, of which 8.5 percent (18,091 units) were vacant (U.S. Census 2010j). Approximately 79 percent of the total housing units in Sedgwick County are located in the City of Wichita, and approximately 9.3 percent (15,492 units) were vacant at the time of the 2010 census (U.S. Census 2010k). Of the vacant housing units in the city and county, almost half were available for rent.

Table 3-35. Housing Data for the City of Wichita and Sedgwick County

Location	Housing Units	Occupied	Vacant	For Rent
City of Wichita	167,310	151,818	15,492	7,252
Sedgwick County	211,593	193,502	18,091	7,982

Source: U.S. Census 2010j, 2010k.

There are three housing opportunities available at McConnell AFB: government housing, unaccompanied housing, and housing in the local community. The current inventory of military family housing on base is 401 units (USAF 2013h). The authorized number of housing units is 364 units according to the 2009–2014 Housing Requirements and Market Analysis (HRMA). Military family housing at McConnell AFB was privatized in September 2013. At that time, the USAF and the Picerne Military Housing Associated with the Corvais Group started renovations on 207 homes and began building 157 new homes (USAF 2013h).

There are three dormitories with a total of 416 dormitory units for unaccompanied Airmen in the rank of E-1 to E-4 with less than 3 years of service on McConnell AFB (USAF 2013h). Housing in the local community is available for unaccompanied Airmen in the ranks of E-4 with 3 or more years of service. The current billeting capacity in the Visiting Quarters is 98 rooms. McConnell AFB has agreements with 25 local hotels to provide availability up to 150 rooms to support the base requirements.

3.4.10.1.4 Education

There are 10 public school districts within Sedgwick County, Kansas. The largest school district in the county is the Wichita Public School District, which includes 57 elementary schools, 16 middle schools, and 12 high schools. Total enrollment in the Wichita Public School District during the 2012–2013 school year was approximately 46,872 students and 3,010 pre-kindergarten through twelfth grade teachers, for a student-to-teacher ratio of 15.6:1 (KSDOE 2013). The student-to-teacher ratio in all counties throughout Kansas ranged from 5.5:1 to 26.1:1 during the same school year (KSDOE 2013).

There are no DoD schools located on McConnell AFB. Students that reside on base are zoned for schools in the Derby, Kansas, school district. There are nine elementary schools, one middle school, one sixth grade center, and one high school in the Derby Public School District. Total enrollment in the Derby Public School District during 2012–2013 was approximately 6,402 students and 401 teachers (pre-kindergarten through grade 12), for a student-to-teacher ratio of 16.0:1 (KSDOE 2013).

3.4.10.1.5 Public Services

Public services in Sedgwick County include law enforcement, fire protection, emergency medical services, and medical services. The Sedgwick County Sheriff's Office is responsible for the law enforcement segment of public safety within the county. In addition to the Sheriff's Office, there are numerous law enforcement agencies in the area (Sedgwick County 2012). Sedgwick County Fire District 1 is composed of nine fire stations, staffed 24 hours a day and located throughout Sedgwick County. Of the 20 cities in Sedgwick County, 10 are in Fire District 1. This covers a response area of 631 square miles and approximately 85,000 citizens. Fire Station 36 provides fire suppression and medical response services to southeastern Sedgwick County and has an automatic aid agreement with McConnell AFB (Sedgwick County 2012).

In addition to fire suppression, Sedgwick County Emergency Medical Service provides emergency response and scheduled transfers for a population of approximately 498,000 citizens in a geographic area of approximately 1,000 square miles (Sedgwick County 2012). There are 17 individual hospitals and approximately 3,100 licensed hospital beds in Sedgwick County.

3.4.10.1.6 Base Services

At McConnell AFB, the 22nd Medical Group delivers and arranges comprehensive medical, dental, and public health care to an eligible population of active-duty and retired military personnel and their families. Medical facilities include day-to-day outpatient medical care, optometry, dental care, and laboratory uses.

Other base services include dining facilities, recreation and fitness centers, and youth and family services. Youth and family services include a CDC, family child care, youth center, and a school-age program. The CDC provides care for children 6 weeks to 5 years old. Availability varies throughout the year, but as of November 2012, there were available openings at the CDC and for the school-age program (USAF 2012f).

3.4.11 Environmental Justice and the Protection of Children

Sedgwick County represents the region of comparison for evaluating disproportionate effects (in Chapter 4) on populations of concern for environmental justice and for children. Table 3-36 shows that the proportion of minority persons in Sedgwick County is much higher than in the State of Kansas, but lower than in the Nation as a whole. Low-income persons compose a

slightly higher proportion of the county's population than in the State of Kansas, but a proportion typical of the Nation. The proportion of children in the county population is slightly higher than the State of Kansas and the Nation as a whole.

Table 3-36. Characterization of Environmental Justice Populations at McConnell AFB

Location	Total Population	Minority		Low-Income[a]	Youth	
		Number	Percent	Percent	Number	Percent
Sedgwick County	498,365	149,931	30.08%	14.00%	135,376	27.16%
Kansas	2,853,118	622,579	21.82%	12.60%	726,939	25.48%
United States	308,745,538	111,927,986	36.25%	14.30%	74,181,467	24.03%

[a] 2007–2011 estimate; all other values based on 2010 census.
Source: U.S. Census 2010j, 2010l, 2012.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents the analysis of the potential environmental consequences from the proposed beddown of KC-46A aircraft in support of the Formal Training Unit (FTU) and First Main Operating Base (MOB 1) missions at four different active-duty Air Force Bases (AFBs). As in Chapter 3, the expected geographic scope of the potential environmental consequences is identified as the region of influence (ROI). This chapter considers both direct and indirect effects of implementation of the action alternatives. Resource definitions, as well as the regulatory setting and methodology of analysis, are located in Volume II, Appendix B. Baseline conditions (refer to Chapter 3) of each relevant environmental resource area are described to provide the public and agency reviewers a meaningful point from which they can compare future potential environmental, social, and economic effects. Cumulative effects are described in Chapter 5.

4.1 ALTUS AIR FORCE BASE (FTU OR MOB 1)

This section of Chapter 4 presents the operational and environmental factors specific to Altus AFB. Sections 2.4.1.2 and 2.4.1.3, respectively, describe the facilities and infrastructure, personnel, and flight operations requirements of the FTU and MOB 1 scenarios and the specific actions at Altus AFB that would be required to implement each scenario. As described in Section 4.5, the No Action Alternative would mean that neither the KC-46A FTU nor the KC-46A MOB 1 scenario would be implemented at Altus AFB at this time. In addition to no facility or personnel changes, there would be no change in based aircraft at Altus AFB; operations at Altus AFB would continue as described for baseline conditions. The 97th Air Mobility Wing (AMW) would continue to fly the training mission with a Primary Aerospace Vehicles Authorized (PAA) of 18 KC-135 aircraft and the personnel described under baseline conditions.

4.1.1 Noise

4.1.1.1 FTU Scenario Noise Consequences

4.1.1.1.1 Base Vicinity

The noise levels of the KC-46A aircraft are slightly less than the KC-135 and C-17 aircraft that currently operate at Altus AFB. Table 4-1 lists the noise levels generated by overflights of all three aircraft types in typical landing and takeoff configurations. Aircraft flying at higher altitudes may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly lower noise levels than shown in Table 4-1. The KC-46A is noticeably quieter than a C-17 in both landing and takeoff configuration. The difference between a KC-135 and a KC-46A during approach would be noticeable, but takeoff noise levels for the two aircraft would be difficult to distinguish.

The KC-46A is expected to use the same flying procedures (e.g., ground tracks, altitude profiles) as are currently flown by KC-135. Aircrews associated with the KC-46A FTU scenario would frequently practice tactical procedures in which the aircraft climbs or descends in the immediate vicinity of the airfield. This training prepares aircrews for operations in forward operating locations where being close to the ground exposes the aircraft to additional risk from ground-based threats. Relative to a standard landing or takeoff, a tactical landing emphasizes low-altitude flying and produces noise near the airfield. It is estimated that about 90 percent of KC-46A training sortie takeoffs and 80 percent of training sortie landings would be conducted using tactical procedures. The KC-46A FTU would mirror ongoing tanker operations making use

of traffic patterns to the west, as well as to the east of the base. Flight patterns to the west of the base began being flown in 2010 to increase peak operational capacity of the base.

Table 4-1. Aircraft Noise Level Comparison at Altus AFB

Aircraft	Power Setting	Sound Exposure Level at Overflight Distance (in decibels)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
KC-46A	60% N1	96	91	85	79	70	61
C-17	1.15 EPR	108	102	95	88	77	68
KC-135	65% NF	100	95	90	84	75	67
Takeoff							
KC-46A	92% N1	107	102	96	88	78	69
C-17	1.42 EPR	114	109	103	97	88	81
KC-135	90% NF	105	100	95	90	81	73

Note: Aircraft airspeed is 160 knots. Aircraft operate at various airspeeds in and around the airfield.
Key: Power Units: N1 – engine speed at Location No. 1; EPR – engine pressure ratio; NF – engine fan revolutions per minute
Source: NOISEMAP 7.2 Maximum Omega 10 Results.

Aircrews associated with the FTU scenario would fly roughly 7.5 sorties per flying day, and each sortie would include about 10 closed patterns (i.e., approaches to airfield followed by maneuver for another approach). Addition of the FTU scenario would increase the total number of annual airfield operations flown at Altus AFB by about 38 percent from about 109,459 to about 150,823. Under normal circumstances, aircrews associated with the FTU would only fly on non-holiday weekdays, mirroring current flying operations.

Night flying is an important component of military readiness; approximately 20 percent of the total KC-46A operations would be flown between 10:00 P.M. and 7:00 A.M. Currently, about 12 percent of airfield operations at Altus AFB are conducted during the night. Noise generated between 10:00 P.M. and 7:00 A.M. has the potential to be particularly disruptive and all such noise events are assessed a 10 decibel (dB) penalty in calculation of the day-night average sound level (DNL) noise metric.

Noise levels near Altus AFB were calculated using NOISEMAP (Version 7.2). Noise modeling was conducted to account for location-specific effects of terrain and ground impedance on noise propagation. Details of the methods used to calculate noise levels and the population affected by elevated noise can be found in Volume II, Appendix B, Section B.1.3. Annoyance is a subjective response that is often triggered by interference of noise with activities. Individuals engaged in activities more easily disrupted by noise (e.g., conversation, sleeping, or watching television) are more likely to become annoyed than others. Although the reaction of an individual to noise depends on a wide variety of factors, social surveys have found a correlation between the time-averaged noise level as measured in DNL and the percentage of the affected population that is highly annoyed (see Volume II, Appendix C, Section C.1.3.1). It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed by noise, and this has been adopted by the U.S. Air Force (USAF) and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.1.7 and Volume II, Appendix C, Section C.1.3.2). Under the FTU scenario, approximately 5,158 total off-base acres and 138 total off-base residents would be affected by noise levels greater than 65 dB DNL (see Table 4-2). This is an increase of 584 off-base acres and an estimated 17 off-base residents relative to baseline conditions. Figure 4-1 compares DNL contours under baseline conditions to the noise contours under the proposed FTU scenario. C-17 aircraft operations are the dominant noise source under both the baseline and the proposed action conditions.

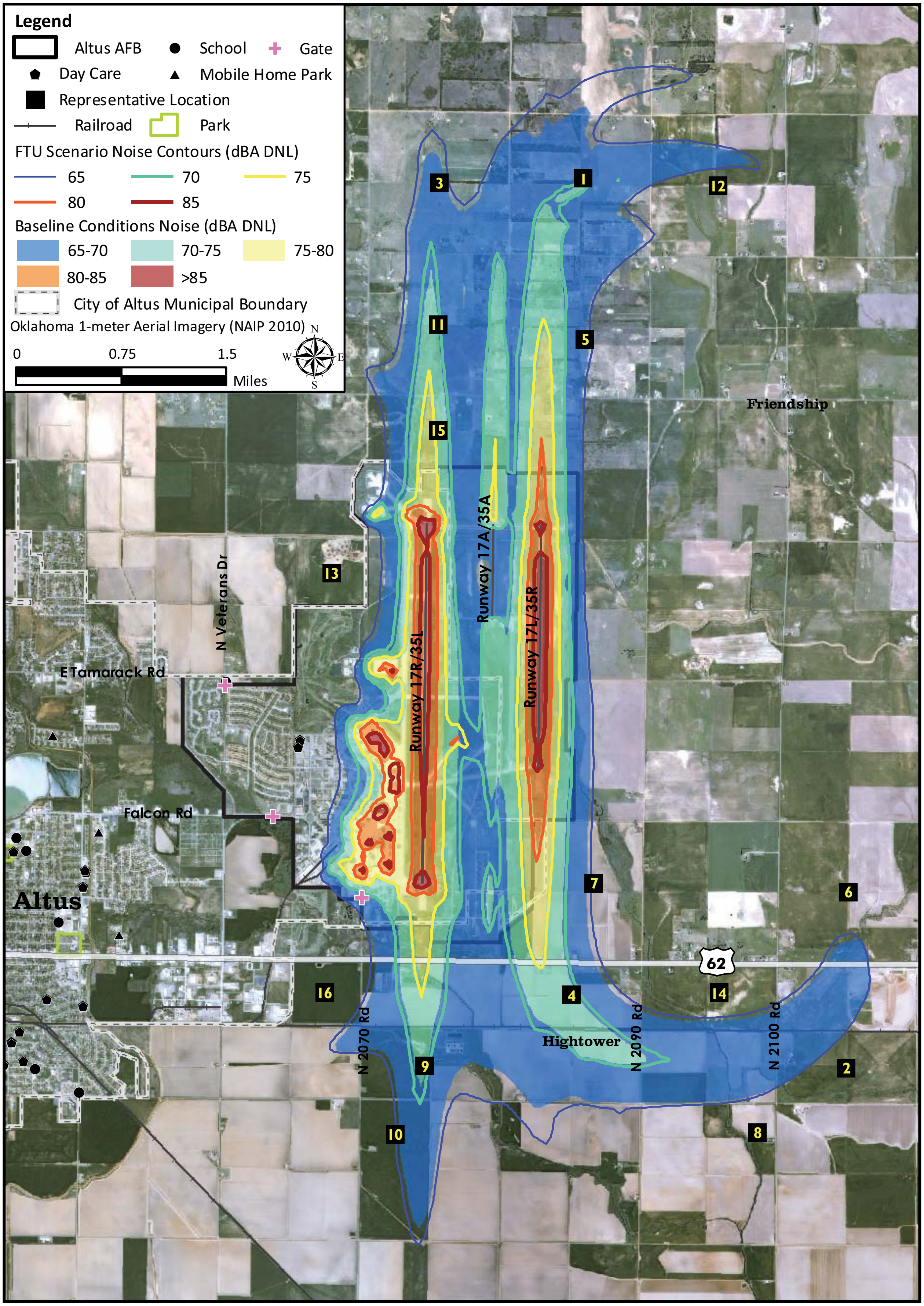

Figure 4-1. KC-46A FTU Scenario and Baseline Noise Contours at Altus AFB

According to current U.S. Department of Defense (DoD) policy, persons exposed to 80 dB DNL over a very long period, with no barriers to the noise, are at an increased risk of noise-induced permanent threshold shift, commonly referred to as hearing loss (USD 2009). The potential for hearing loss due to noise is discussed in Volume II, Appendix C, Section C.2.4. Under the FTU scenario, noise levels greater than 80 dB DNL would affect 12 acres of land outside of Altus AFB (an increase of 7 acres relative to baseline conditions). However, Census data and aerial photography indicate no residences exist in the affected area (see Table 4-2). On base, a total of 5 structures (1 more than under baseline conditions) would be affected by noise levels of 80 dB DNL or greater under the FTU scenario. None of the structures affected are residential. Hearing loss risk among people working in high-noise environments on Altus AFB would continue to be assessed and managed in accordance with DoD, Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH) regulations regarding occupational noise exposure.

Table 4-2. KC-46A FTU and MOB 1 Scenario Noise Impacts Relative to Baseline Noise at Altus AFB

Noise Level (dB DNL)	Baseline Conditions			FTU Scenario			MOB 1 Scenario		
	Off-Base Population	Off-Base Acres	On-Base Acres	Off-Base Population	Off-Base Acres	On-Base Acres	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	97	3,433	961	109	3,802	802	100	3,508	906
70–74	22	945	914	26	1,107	1,008	24	1,004	930
75–79	2	191	627	3	237	650	3	209	671
80–84	0	5	467	0	12	457	0	8	481
≥85	0	0	87	0	0	182	0	0	119
Total	**121**	**4,574**	**3,056**	**138**	**5,158**	**3,099**	**127**	**4,729**	**3,107**

Noise conditions at several representative locations surrounding Altus AFB are presented in Table 4-3 for baseline conditions and the FTU scenario. These points, which are shown on Figure 4-1, are geographic center points of U.S. Census subdivisions, and therefore do not represent specific noise-sensitive receptors. Noise levels would change by 1 dB DNL or less under the FTU scenario. The KC-46A FTU scenario would be additive to the current mission at Altus AFB, resulting in an increase in DNL in the base vicinity. For each location, a range of sound exposure levels (SELs) is provided for the loudest five flight procedures experienced at that location. Note that ground tracks and aircraft configuration vary from flight to flight based on winds and other factors, so flight procedures could be louder or quieter than the SEL values listed in Table 4-3. The range of SELs of the loudest five overflights would remain unchanged at all of the locations except Location 8. At Location 8, a KC-46A departure operation is one of the loudest five operations. Table C-1-1 in Volume II, Appendix C, Attachment C-1, details the major noise contributors at each location under each scenario at Altus AFB.

Construction and demolition (C&D) activities in support of the proposed beddown would be conducted in the context of an active AFB where aircraft and other types of noise are a normal part of the environment. Although equipment would be muffled, construction activities unavoidably generate localized increases in noise qualitatively different from aircraft noise. For example, a typical backhoe, dozer, and crane generate up to approximately 78, 82, and 81 dB, respectively, at a distance of 50 feet (FHWA 2006). Construction noise would be minimized in accordance with local regulations and would be temporary and intermittent, lasting only the duration of the project. Furthermore, construction activities would be expected to take place during normal working

hours (i.e., 7:00 A.M. to 5:00 P.M.). Some people living or working near the construction sites may notice and be annoyed by the noise, but noise impacts would not be substantial enough to be considered significant.

Table 4-3. KC-46A FTU and MOB 1 Scenario Noise Levels at Representative Locations Near Altus AFB

Location ID	Baseline		FTU Scenario		MOB 1 Scenario	
	DNL (dB)	Top 5 SELs (dB)[a]	DNL (dB)	Top 5 SELs (dB)[a]	DNL (dB)	Top 5 SELs (dB)[a]
1	69	99–107	69	99–107	69	99–107
2	62	91–97	63	91–97	62	91–97
3	66	99–102	67	99–102	66	99–102
4	71	97–102	71	97–102	71	97–102
5	65	98–101	66	98–101	66	98–101
6	62	92–97	63	92–97	63	92–97
7	67	98–101	68	98–101	67	98–101
8	61	90–94	62	91–94	61	91–94
9	71	103–104	71	103–104	71	103–104
10	64	96–101	65	96–101	65	96–101
11	70	102–104	71	102–104	70	102–104
12	63	92–98	64	92–98	63	92–98
13	58	91–93	58	91–93	58	91–93
14	63	93–98	63	93–98	63	93–98
15	73	105–106	74	105–106	73	105–106
16	60	90–95	61	90–95	60	90–95

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Attachment C-1).

4.1.1.1.2 Auxiliary Airfields

Aircrews operating the KC-46A would make use of airfields other than Altus AFB to provide diverse training experiences. The KC-46A would be operated at the same airfields used by Altus-based KC-135 aircraft currently, and at about the same frequency. As shown in Table 4-1, KC-135 aircraft are slightly louder than KC-46A aircraft. Aircrews operating the KC-46A would use the same flight routes to access the auxiliary airfields and would operate on the same flight tracks that are used by the KC-135 aircraft while operating at the auxiliary airfields. Auxiliary airfields would generally not be used between 10:00 P.M. and 7:00 A.M. Additional data supporting conclusions about expected noise level increases at the auxiliary airfields can be found in Volume II, Appendix B, Section B.1.3.2.

Rick Husband Amarillo International Airport (AMA), TX. It is estimated that 517 KC-46A annual airfield operations would be conducted at AMA. Additional flying would take place in the context of the current annual 54,115 airfield operations. In this context, proposed KC-46A activity would not be expected to have any noticeable effect on noise levels. A mathematical comparison was made of existing and proposed operations levels, and it was found that DNL at locations near the airfield would increase by less than 0.5 dB (see Volume II, Appendix B, Section B.1.3.2). People living near the airfield may visually notice the KC-46A overflights, but no substantive noise impacts would be expected to occur.

Clinton-Sherman Industrial Airpark (CSM), OK. CSM currently supports 28,485 annual airfield operations; under the KC-46A FTU scenario, an additional 3,681 annual airfield operations would be flown at the airfield. Mathematical comparison of existing and proposed operations indicate that an

increase of greater than 0.5 dB DNL would be possible as a result of the proposed KC-46A FTU operations. The program NOISEMAP was run to quantify impacts. The number of off-airport acres affected by noise levels at or above 65 dB DNL would increase by 5 acres from 1,607 to 1,612, an increase of 0.3 percent. In the context of ongoing flying activity, KC-46A operations associated with the FTU scenario would have no substantive noise impacts.

Fort Worth Alliance Airport (AFW), TX. Aircrews associated with the KC-46A FTU scenario would fly about 2,170 annual airfield operations at AFW, which currently supports 100,756 annual operations. The KC-46A operations would be expected to increase the noise level by less than 0.5 dB DNL and no substantive noise impacts would be expected to occur.

Lubbock Preston Smith International Airport (LBB), TX. Aircrews associated with the KC-46A FTU scenario would be expected to conduct about 148 annual operations at LBB, which currently supports about 67,919 annual airfield operations. These additional operations would be expected to increase noise levels near the airfield by less than 0.5 dB DNL. In the context of ongoing operations, the proposed KC-46A operations would not be expected to have any substantive noise impacts.

4.1.1.2 MOB 1 Scenario Noise Consequences

KC-46A MOB 1 aircrews would use flight procedures similar to those currently used by KC-135 aircraft based at Altus AFB. Under the MOB 1 scenario, tactical operations would make up about 25 percent of total takeoffs and 40 percent of initial landings. These operations would be less frequent than they would be for the FTU. The 36 PAA that would beddown at Altus AFB under the MOB 1 scenario would conduct about 33,710 airfield operations per year. These operations would be conducted in addition to the 109,459 operations per year ongoing currently. Under the MOB 1 scenario, flying would be conducted on some weekend days, as part of Reserve unit training. In total, KC-46A aircrews would fly training sorties on 312 days per year. Mission sorties could take place on any day of the year, but would not include multiple training approaches to the airfield.

Aircrews associated with the MOB 1 scenario would conduct a lower percent of total KC-46A operations at night than under the FTU scenario. Under the MOB 1 scenario, about 10 percent of KC-46A operations would be flown during the period between 10:00 P.M. and 7:00 A.M. This equates to about two initial approaches and 18 closed patterns between 10:00 P.M. and 7:00 A.M. per flying day.

Noise levels near Altus AFB under the MOB 1 scenario were calculated using the computer program NOISEMAP (Version 7.2) and include the location-specific effects of terrain and ground impedance. Approximately 4,729 total off-base acres and 127 total off-base residents would be affected by noise levels greater than 65 dB DNL (see Table 4-2). This would be a net increase of 155 off-base acres and 6 off-base residents relative to baseline conditions. Figure 4-2 compares DNL noise contours under baseline conditions to noise contours under the proposed MOB 1 scenario.

Noise levels greater than 80 dB DNL would affect 8 acres of land outside of Altus AFB, but interpretation of aerial photography and U.S. Census data indicate no residents in the affected area (see Table 3-2). On base, four nonresidential buildings would be affected by noise levels of 80 dB or greater. The area affected by high noise levels on base is different under the MOB 1 scenario than under the FTU scenario because KC-46A static engine runs would be conducted at different locations, causing a difference in the noise contours. Hearing loss risk among people working in high-noise environments on Altus AFB would continue to be assessed and managed in accordance with DoD, OSHA, and NIOSH regulations regarding occupational noise exposure.

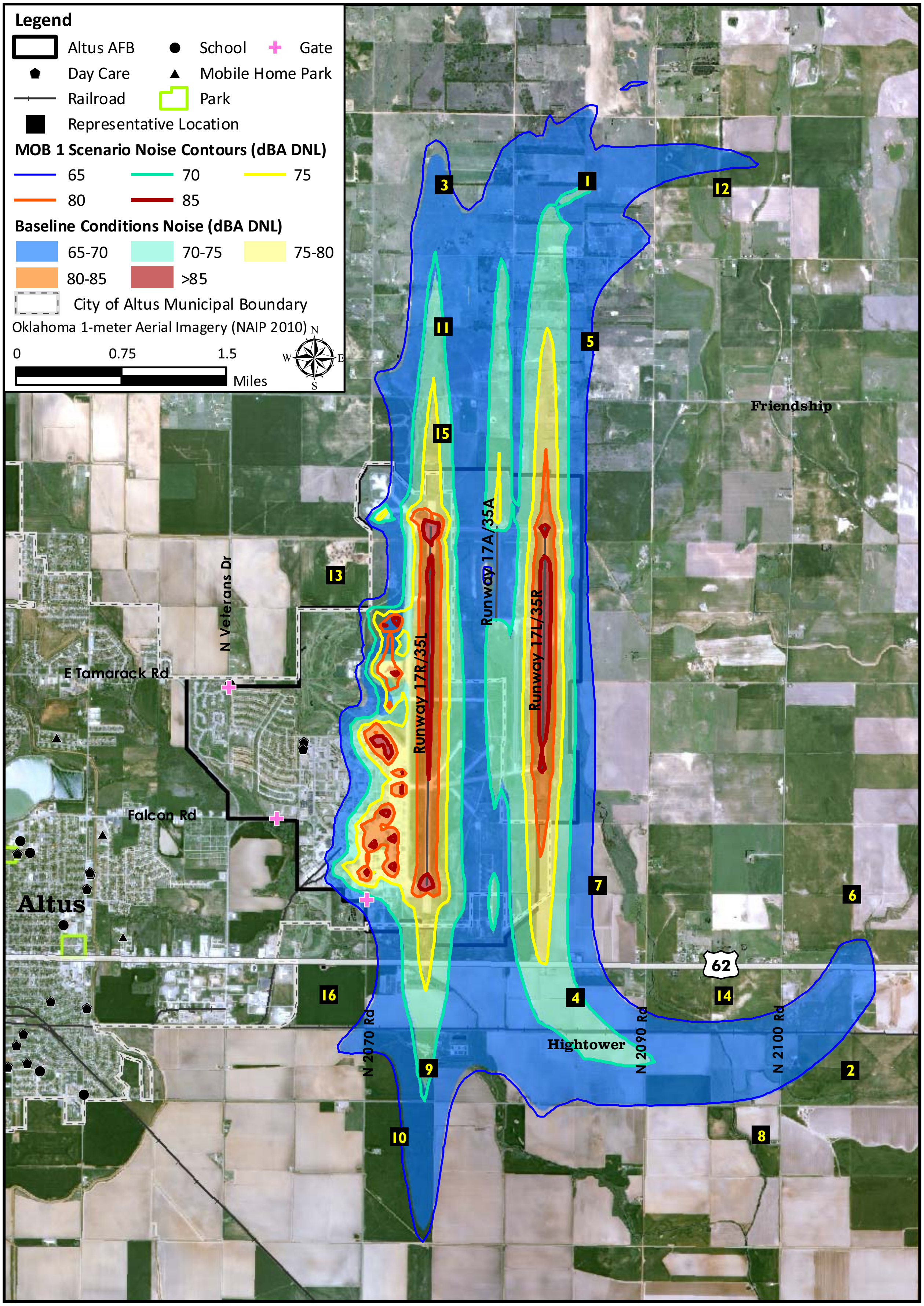

Figure 4-2. KC-46A MOB 1 Scenario and Baseline Noise Contours at Altus AFB

DNL values and the SEL generated by the loudest five types of overflights at several representative locations under the MOB 1 scenario are listed in Table 4-3 and depicted on Figure 4-2. The representative locations were established based on central points of U.S. Census subdivisions. DNL would increase by 1 dB at 3 of the 16 locations, and would remain unchanged at the other 13 locations.

The range of SELs of the loudest five overflights would remain unchanged at all locations except Location 8. At Location 8, a KC-46A departure operation is one of the loudest five operations. At each location, the dominant noise sources are C-17 closed pattern operations and transient T-38 closed pattern operations. A more detailed description of the major noise-contributing operations at each location can be found in Table C-1-1 in Volume II, Appendix C, Attachment C-1.

As described in Section 2.3.3, Initial Operational Test and Evaluation (IOT&E) operations would be conducted at the MOB 1 location. IOT&E operations would be expected to be indistinguishable to members of the public from standard MOB 1 flying operations and would taper off before the MOB 1 reaches full operations tempo such that operations counts listed for MOB 1 would not be exceeded.

C&D noise under the MOB 1 scenario would produce similar or higher impacts compared to the FTU scenario, as this scenario would require a larger amount of C&D activity. Due to the temporary and intermittent nature of C&D and its associated noise level, noise impacts would not be substantial enough to be considered significant.

4.1.2 Air Quality

The air quality analysis estimated the magnitude of emissions that would result from implementation of the proposed KC-46A construction and operational activities at Altus AFB. The estimation of proposed operational emissions is based on the net change in emissions between existing aircraft operations and the projected KC-46A operations. Volume II, Appendix D, Section D.1.1, of this Final Environmental Impact Statement (EIS) includes estimations of criteria pollutant emissions, hazardous air pollutants (HAPs), and greenhouse gases (GHGs) from proposed sources at Altus AFB. GHGs are reported as carbon dioxide equivalent (CO_{2e}).

Air quality impacts from the KC-46A scenarios at Altus AFB were reviewed for significance relative to Federal, state, and local air pollution standards and regulations. In the case of criteria pollutants for which the ROI is in attainment of the National Ambient Air Quality Standards (NAAQS), the analysis used the Prevention of Significant Deterioration (PSD) threshold for new major sources of 250 tons per year of that pollutant as an indicator of significance or non-significance of projected air quality impacts. In the case of criteria pollutants for which the project region does not attain an NAAQS, the analysis used the pollutant threshold that requires a conformity determination for that region. If proposed emissions exceed a PSD or conformity threshold, further analysis was conducted to determine whether impacts were significant. In such cases, if proposed emissions (1) would not be expected to contribute to an exceedance of an ambient air quality standard or (2) conform to the approved State Implementation Plan (SIP), then impacts would be less than significant.

The project region within Jackson County and the areas surrounding three (CSM, LBB, and AMA) of the four auxiliary airfields attain all of the NAAQS. Therefore, the analysis used the PSD threshold of 250 tons per year of a pollutant as an indicator of significance of projected air quality impacts within these areas. Since the region that encompasses the AFW auxiliary airfield is in serious nonattainment of the ozone (O_3) NAAQS, the analysis used the applicable conformity thresholds for that region as both an indicator of significance (50 tons per year of

volatile organic compounds [VOCs] and nitrogen oxides [NO_x]) and to determine whether a *de minimis* finding may be made or a positive general conformity determination is required.

Construction – The KC-46A scenarios at Altus AFB would require construction and/or renovation of airfield facilities, including training facilities, hangars, taxiways, and maintenance and fueling facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions resulting from the use of fossil fuel-powered equipment and (2) fugitive dust emissions (particulate matter less than or equal to 10 microns [PM_{10}] or 2.5 microns [$PM_{2.5}$] in diameter) resulting from the operation of equipment on exposed soil. Construction activity data were developed to estimate proposed construction equipment usages and associated combustive and fugitive dust emissions for each project alternative.

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollutant Emission Factors*, AP-42, Volume I (USEPA 1995); the U.S. Environmental Protection Agency (USEPA) NONROAD2008a model for nonroad construction equipment (USEPA 2009a); and the USEPA MOVES2010b model for on-road vehicles (USEPA 2013b).

Inclusion of standard construction practices and Leadership in Energy and Environmental Design (LEED) Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil. The standard construction practices for fugitive dust control could include the following:

1. Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
2. Minimize the amount of disturbed ground area at a given time.
3. Suspend all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site and stabilize all disturbed areas with water application.
4. Designate personnel to monitor the dust control program and to increase watering, as necessary, to minimize the generation of dust.

Operations – Sources associated with operation of the proposed FTU and MOB 1 scenarios at Altus AFB would include (1) operations and engine maintenance/testing of aircraft, (2) onsite privately owned vehicles (POVs) and government motor vehicles (GMVs), (3) offsite POV commutes, (4) aerospace ground equipment (AGE), (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and other sources. Operational data used to calculate projected KC-46A aircraft emissions were obtained from data used in the project noise analyses (see Section 4.1.1). Factors used to calculate combustive emissions for the KC-46A aircraft were based on emissions data developed by Pratt and Whitney for the PW4062 engine (ICAO 2013b). The operational times in mode for the KC-46A engine were based on those currently used for the KC-135 aircraft (Air Force Civil Engineer Center 2013).

Emissions from non-aircraft sources resulting from the proposed FTU and MOB 1 scenarios were estimated by multiplying existing emissions for these sources at Altus AFB by the ratio of total employment populations associated with each proposed scenario and baseline conditions at Altus AFB. The emission estimations also simulated the gradual turnover of these sources in the future to vehicle and equipment fleets with new and cleaner USEPA emission standards. The air quality analysis used calendar year (CY) 2012 to define existing emissions, as it included the most recent calendar year of operational activities at Altus AFB (see Table 3-5). Emissions from the usage of AGE by the KC-46A were based on AGE usages for existing C-17 and KC-135 aircraft at Altus AFB.

The analysis of proposed aircraft operations is limited to operations that occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

4.1.2.1 FTU Scenario Air Quality Consequences

Table 4-4 presents estimates of emissions from construction activities that would result from implementing the FTU scenario at Altus AFB. These data show that, for each year of construction, total emissions would fall well below the PSD thresholds used to indicate significance or insignificance. Therefore, temporary construction emissions resulting from the FTU scenario would produce less than significant air quality impacts. The main sources of PM_{10}/$PM_{2.5}$ emissions would be fugitive dust from the operation of equipment on unpaved surfaces.

Table 4-4. Annual Construction Emissions Under the FTU Scenario at Altus AFB

Year/Construction Activity	Air Pollutant Emissions (tons per year)						
	VOCs	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_{2e} (mt)**
CY 2014							
Demolition	0.01	0.04	0.10	0.00	0.07	0.02	15.19
Building Renovations/Additions	0.05	0.30	0.53	0.01	0.09	0.05	72.01
Total CY 2014	**0.06**	**0.34**	**0.63**	**0.02**	**0.16**	**0.07**	87.20
CY 2015							
Building Renovations/Additions	0.17	0.97	1.82	0.05	0.31	0.17	260.22
Total CY 2015	**0.17**	**0.97**	**1.82**	**0.05**	**0.31**	**0.17**	260.22
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

The air quality impact analysis of the FTU scenario at Altus AFB is based on the net increase in emissions associated with the beddown of eight KC-46A aircraft. To produce a conservative analysis, it is assumed that all KC-46A aircraft associated with the FTU scenario would become operational at Altus AFB in CY 2016.

Table 4-5 summarizes the annual emissions that would result from KC-46A FTU operations at Altus AFB. These data show that the increase in emissions from the addition of eight KC-46A aircraft at Altus AFB would not exceed 250 tons per year for VOCs, carbon monoxide (CO), sulfur oxides (SO_x), PM_{10}, or $PM_{2.5}$. Therefore, the FTU scenario would produce less than significant impacts on these pollutant levels. However, these data also show that the increase in NO_x emissions from the FTU scenario would exceed 250 tons per year. KC-46A aircraft operations and on-wing engine testing activities are the primary contributors to these emission increases.

The NO_x emission increases that would result from the FTU scenario would amount to 99 percent of the total NO_x emissions generated from current operations at Altus AFB. The majority of proposed NO_x emissions generated by the FTU scenario would result from KC-46A aircraft operations up to an altitude of 3,000 feet above ground level (AGL) and across several square miles that make up the Altus AFB airspace and adjoining aircraft flight patterns. These emissions would be adequately dispersed through this volume of atmosphere to the point that

they would result in no substantial ground-level impacts in a localized area. Jackson County generates relatively low amounts of NO_x emissions (see Table 3-4) and it attains all NAAQS by wide margins. Therefore, proposed NO_x emissions resulting from the FTU scenario, in combination with existing emissions, would likely not be substantial enough to contribute to an exceedance of an ambient air quality standard. Therefore, KC-46A operations associated with the FTU scenario at Altus AFB would produce less than significant air quality impacts.

Table 4-5. Annual Operations Emissions Under the FTU Scenario at Altus AFB, CY 2016

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-46A Aircraft Operations	34.63	157.55	1,034.50	54.09	3.35	2.84	150,110
On-Wing Aircraft Engine Testing – KC-46A	14.14	48.41	23.62	1.88	0.17	0.15	5,226
Aerospace Ground Support Equipment – KC-46A	0.13	0.98	1.11	0.04	0.16	0.15	1,094
C-17 Aircraft Operations	25.92	234.56	811.10	68.54	202.86	202.86	115,409
KC-135 Aircraft Operations	3.87	155.10	210.64	35.75	52.00	52.00	60,195
Transient Aircraft	1.38	5.07	3.15	0.31	0.77	0.77	530
On-Wing Aircraft Engine Testing – C-17	0.16	7.77	9.77	0.64	4.24	4.24	1,633
On-Wing Aircraft Engine Testing – KC-135	0.11	14.32	7.07	0.82	0.05	0.05	2,071
Aerospace Ground Support Equipment – Existing Aircraft	0.59	4.27	4.83	0.19	0.71	0.65	4,741
Government Motor Vehicles	0.08	0.79	1.70	0.00	0.09	0.08	510
Privately Owned Vehicles – On Base	0.13	6.91	0.87	0.02	0.08	0.04	1,189
Privately Owned Vehicles – Off Base	0.38	20.45	2.28	0.06	0.33	0.14	3,389
Nonroad Equipment	5.35	74.86	2.28	0.49	0.29	0.29	2,523
Mobile Fuel Transfer Operations	0.11	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	2.21	6.77	11.16	0.20	1.21	0.54	[a]
Total Altus AFB Emissions – FTU Scenario	**90.06**	**737.82**	**2,124.08**	**163.02**	**266.31**	**264.79**	**348,618**
Existing Altus AFB Emissions	**55.39**	**573.25**	**1,069.38**	**106.96**	**262.74**	**261.86**	**191,769**
Altus AFB FTU Scenario Minus Existing Emissions	**34.67**	**164.57**	**1,054.70**	**56.06**	**3.58**	**2.93**	**156,850**
FTU Scenario Net Emissions Increase Fraction of Existing Emissions	**0.63**	**0.29**	**0.99**	**0.52**	**0.01**	**0.01**	**0.82**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

4.1.2.1.1 Auxiliary Airfields

Emissions from KC-46A FTU operations would occur within the immediate area of the auxiliary airfields and aircraft flight routes between these areas and Altus AFB. Table 4-6 summarizes the annual emissions that would result from KC-46A operations proposed at each auxiliary airfield associated with the FTU scenario at Altus AFB. These data show that the proposed increase in emissions at CSM, LBB, and AMA would not exceed a PSD threshold. In addition, the increase in proposed emissions at AFW would not exceed an applicable PSD or conformity threshold. Therefore, KC-46A operations at all four auxiliary airfields associated with the FTU scenario would produce less than significant air quality impacts and a general conformity *de minimis* determination may be made for the projected increases in NO_x and VOC emissions at AFW.

Table 4-6. Annual Emissions from KC-46A FTU Operations at Auxiliary Airfields Near Altus AFB, CY 2016

Auxiliary Airfield	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Clinton Sherman Industrial Airpark (CSM)	0.35	4.43	79.53	4.03	0.24	0.20	11,242
Rick Husband Amarillo International Airport (AMA)	0.05	0.64	11.59	0.58	0.03	0.03	1,627
Lubbock Preston Smith International Airport (LBB)	0.10	1.32	23.66	1.20	0.07	0.06	3,344
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**
Fort Worth Alliance Airport (AFW)	0.10	1.32	23.66	1.20	0.07	0.06	3,344
Conformity/PSD Threshold	**50**	**250**	**50**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

4.1.2.2 MOB 1 Scenario Air Quality Consequences

Table 4-7 presents estimates of emissions from construction activities that would result from implementation of the MOB 1 scenario at Altus AFB. These data show that, for each year of construction, total emissions would fall well below the PSD thresholds used to indicate significance or insignificance. Therefore, temporary construction emissions resulting from the MOB 1 scenario would produce less than significant air quality impacts. The main sources of PM_{10}/$PM_{2.5}$ emissions would be fugitive dust from the operation of equipment on unpaved surfaces.

Table 4-7. Annual Construction Emissions Under the MOB 1 Scenario at Altus AFB

Year	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
CY 2014	1.63	27.19	13.37	0.35	25.81	3.68	2,017.41
CY 2015	0.33	4.26	3.10	0.09	2.15	0.46	475.41
CY 2016	0.54	2.96	5.87	0.17	8.04	1.26	900.39
CY 2018	0.01	0.26	0.05	0.00	0.04	0.01	11.27
CY 2021	0.14	7.47	0.17	0.01	0.43	0.05	56.72
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

The air quality impact analysis of the MOB 1 scenario at Altus AFB is based on the net increase in emissions that would result from the beddown of 36 KC-46A aircraft. To produce a conservative analysis, it is assumed that all KC-46A aircraft associated with the MOB 1 scenario would become operational at Altus AFB in CY 2016.

Table 4-8 summarizes the annual emissions that would result from implementation of the MOB 1 scenario at Altus AFB. The data in Table 4-8 show that the increase in emissions from the addition of 36 KC-46A aircraft would not exceed 250 tons per year for VOCs, SO_x, PM_{10}, or $PM_{2.5}$. Therefore, the MOB 1 scenario would produce less than significant impacts on these pollutant levels. However, these data also show that the increase in CO and NO_x emissions from the MOB 1 scenario would exceed 250 tons per year. KC-46A aircraft operations and on-wing engine testing activities are the primary contributors to these emission increases.

Table 4-8. Annual Operations Emissions Under the MOB 1 Scenario at Altus AFB, CY 2016

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-46A Aircraft Operations	50.07	201.73	837.56	45.42	2.92	2.49	125,647
On-Wing Aircraft Engine Testing – KC-46A	14.39	49.54	28.94	2.34	0.21	0.19	6,286
Aerospace Ground Support Equipment – KC-46A	0.21	1.51	1.70	0.07	0.25	0.23	1,686
C-17 Aircraft Operations	25.92	234.56	811.10	68.54	202.86	202.86	104,917
KC-135 Aircraft Operations	3.87	155.10	210.64	35.75	52.00	52.00	54,722
Transient Aircraft	1.38	5.07	3.15	0.31	0.77	0.77	530
On-Wing Aircraft Engine Testing – C-17	0.16	7.77	9.77	0.64	4.24	4.24	1,633
On-Wing Aircraft Engine Testing – KC-135	0.99	14.32	7.07	0.82	0.05	0.05	2,071
Aerospace Ground Support Equipment – Existing Aircraft	0.59	4.27	4.83	0.19	0.71	0.65	4,741
Government-Owned Vehicles	0.10	1.01	2.19	0.01	0.12	0.10	657
Privately Owned Vehicles – On Base	0.16	8.90	1.12	0.03	0.10	0.05	1,531
Privately Owned Vehicles – Off Base	0.49	26.35	2.94	0.07	0.42	0.18	4,366
Nonroad Equipment	6.89	96.45	2.94	0.63	0.37	0.37	3,250
Mobile Fuel Transfer Operations	0.14	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	2.84	8.73	14.38	0.26	[a]	[a]	[a]
Total Altus AFB Emissions – MOB 1 Scenario	**108.19**	**815.32**	**1,938.34**	**155.06**	**266.59**	**264.88**	**312,037**
Existing Altus AFB Emissions	**55.39**	**573.25**	**1,069.38**	**106.96**	**262.74**	**261.86**	**191,769**
Altus AFB MOB 1 Scenario Minus Existing Emissions	**52.80**	**242.07**	**868.96**	**48.10**	**3.85**	**3.01**	**120,269**
MOB 1 Scenario Net Emissions Increase Fraction of Existing Emissions	**0.95**	**0.42**	**0.81**	**0.45**	**0.01**	**0.01**	**0.63**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

The CO and NO_x emission increases that would result from the MOB 1 scenario would amount to 54 and 84 percent, respectively, of the total CO and NO_x emissions generated from current operations at Altus AFB. The majority of proposed CO and NO_x emissions generated by the MOB 1 scenario would result from KC-46A aircraft operations up to an altitude of 3,000 feet AGL and across the several square miles that make up the Altus AFB airspace and adjoining aircraft flight patterns. These emissions would be adequately dispersed through this volume of atmosphere to the point that they would result in no substantial ground-level impacts in a localized area. Jackson County generates relatively low levels of CO and NO_x emissions (see Table 3-4) and is in attainment of all NAAQS by wide margins. Therefore, proposed CO and NO_x emissions resulting from implementation of the MOB 1 scenario, in combination with existing emissions, would likely not be substantial enough to contribute to an exceedance of an ambient air quality standard. Therefore, operations resulting from the MOB 1 scenario at Altus AFB would produce less than significant air quality impacts.

Proposed operations under the FTU and MOB 1 scenarios at Altus AFB would emit HAPs that could potentially impact public health. Proposed KC-46A aircraft operations and on-wing engine testing activities would generate the majority of HAPs from these scenarios. As discussed above for proposed criteria pollutant impacts, since proposed KC-46A operations would occur intermittently over a volume of atmosphere, they would produce minimal ambient impacts of HAPs in a localized area.

Early in its planning, the USAF reconsidered its operational assumptions and projections to avoid or reduce potential impacts to the extent feasible. This resulted in the development of alternatives that reduced the emissions of criteria pollutants to the extent feasible by reducing the number of near-field operations, such as landing and take-off operations. At this time, the USAF is not aware of any other feasible mitigations that could be applied to further reduce the emissions impact from KC-46A aircraft operations and on-wing engine testing activities.

In addition to presenting estimates of GHG emissions that would result from implementation of the KC-46A scenarios at Altus AFB, the following considers how climate change may impact the KC-46A beddown scenarios at Altus AFB. For Altus AFB, the projected climate change impact of concern is increased aridity, as documented in *Global Climate Change Impacts in the United States* (USGCRP 2009). This report predicts that the Great Plains region surrounding Altus AFB will experience warmer temperatures and decreasing precipitation. These conditions will produce more frequent extreme events such as heat waves, droughts, scarcities of water supplies, and heavy rainfall. While operations at Altus AFB have already adapted to droughts, high temperatures, and scarce water supplies, exacerbation of these conditions in the future may increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts.

4.1.3 Safety

This section addresses the potential environmental consequences to flight and ground safety that could occur at or in the vicinity of Altus AFB with implementation of either the FTU or MOB 1 scenario. While the KC-46A is a new introduction to the USAF tanker fleet, this aircraft is based on the existing commercial Boeing 767 Jetliner, which has been in commercial service since 1982. As of November 2011, the B-767 has been in 16 mishaps worldwide. Note that, of these, 7 were not related to the aircraft or flight crew. The commercial accident rate of the B-767 is 0.36 per flight cycle (defined as per million takeoffs). As is the case with the KC-135 (also based upon a commercial airframe, the Boeing 707), it is expected that, over time, the accident rate of the KC-46A will be similar to that of the B-767. Note that historically

the accident rates for the military versions of the commercial airframes have been lower than those for the commercial airframes.

4.1.3.1 FTU Scenario Safety Consequences

4.1.3.1.1 Flight Safety

Aircraft Mishaps – The addition of up to eight KC-46A aircraft would result in an increase in airfield operations and accident potential over those generated by existing KC-135s and C-17s at Altus AFB. However, the KC-46A would operate within the airfield under similar procedures currently in use for the KC-135 mission. Current safety policies and procedures at the base ensure the lowest possible potential for aircraft mishaps. These safety policies and procedures would continue upon implementation of the FTU scenario.

As discussed previously, the accident rate for the KC-46A is expected to be similar to that of the commercial airframe upon which it is based. Using the accident rate of 0.36 per flight cycle, it is projected that the probability of a KC-46A accident in the vicinity of the airfield would be low (less than one every 100 years; see Volume II, Appendix B, Section B.3.3.1).

Therefore, implementation of the KC-46A FTU scenario at Altus AFB is not anticipated to result in any net increase in the safety risks associated with aircraft mishaps or any increase in the risks of occurrence of those mishaps.

Bird/Wildlife-Aircraft Strike Hazard – Altus AFB has an ongoing BASH program. To address bird/wildlife-aircraft strikes, the USAF has developed the Avian Hazard Advisory System to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the Avian Hazard Advisory System is an online, near-real-time geographic information system (GIS) used for bird strike risk flight planning across the Continental United States (CONUS) and Alaska.

Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology as a tool for analysis and correlation of bird habitat, migration, and breeding characteristics with key environmental and manmade geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings, which take place prior to any sortie.

With KC-46A flight operations similar to those being conducted by KC-135 aircraft at Altus AFB, the overall potential for bird/wildlife-aircraft strikes is not anticipated to be significantly greater than current levels. All safety actions in place for existing KC-135 training would continue to be in place for the KC-46A aircraft. Altus AFB personnel have developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and have documented detailed procedures to monitor and react to heightened risk of bird strikes (Altus AFB 2012a). When bird/wildlife-aircraft strike hazard risks increase, limits are placed on low-altitude flight and some types of training (e.g., multiple approaches, closed-pattern pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the potential for bird strikes is high within the airspace. KC-46A pilots would be subject to these procedures. Therefore, no significant impact would occur related to bird/wildlife-aircraft strike hazard issues.

4.1.3.1.2 Ground Safety

There are no aspects of the FTU aircraft basing scenario at Altus AFB that are expected to create new or unique ground safety issues not already addressed by current policies and procedures.

Operations and maintenance procedures, as they relate to ground safety, are conducted by base personnel and would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulations, technical orders, and Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) standards.

No unique construction practices or materials would be required as part of any of the renovation, addition, or construction projects associated with the KC-46A FTU scenario at Altus AFB. All renovation and construction activities would comply with all applicable U.S. Occupational Health and Safety Administration (OSHA) regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements. The USAF does not anticipate any significant safety impacts as a result of construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented.

The KC-46A would be operated in an airfield environment similar to the current operational environment. Since the KC-46A is a new airframe and would require response actions specific to the aircraft, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the KC-46A and associated equipment. With this update, the Altus AFB airfield safety conditions would be similar to baseline conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

Capability for fire response is located on base and in nearby communities. The base Fire Department is party to mutual-aid support agreements with the nearby communities. These functions would continue to occur as they have under current conditions. The increase in aircraft operations would increase the risk of mishaps in training areas, including over the clear zones (CZs) and accident potential zones (APZs). See Volume II, Appendix B, Figure B-1, for the typical generic CZ and APZ dimensions. However, the base prioritizes compatible land use planning with surrounding jurisdictions to manage future incompatible development.

4.1.3.2 MOB 1 Scenario Safety Consequences

The primary difference between the KC-46A FTU and the MOB 1 scenario at Altus AFB would be the additional 28 KC-46A aircraft and the additional airfield operations associated with the MOB 1 scenario. As previously described for the FTU scenario, it is projected that the probability of a KC-46A accident in the vicinity of the airfield would be low. Therefore, implementation of the KC-46A MOB 1 scenario at Altus AFB is not anticipated to result in any net increase in the safety risks associated with aircraft mishaps or any increase in the risks of occurrence of those mishaps.

4.1.4 Soils and Water

4.1.4.1 FTU Scenario Soils and Water Consequences

All of the construction and demolition (C&D) activities associated with the proposed KC-46A FTU scenario would occur within the Altus AFB boundary. With the exception of a portion of the new Flight Training Center, much of this work would occur on previously disturbed areas. As shown in Table 2-3, the total potential disturbed area for the projects associated with the FTU scenario would not exceed 5 acres (new construction and additions/alterations).

For any projects that result in soil disturbance, the USAF would ensure that all construction activities are conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. The USAF would specify compliance with the stormwater discharge permit in the contractor construction requirements.

The Altus AFB Storm Water Pollution Prevention Plan (SWPPP) for industrial facilities identifies control practices that would be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. The SWPPP would be updated to reflect the soil disturbance activities associated with the FTU scenario.

Based on the location of the proposed activities, as depicted on Figure 2-4, no sensitive groundwater resources, surface water resources, or floodplains are potentially impacted within the areas of the base proposed for the FTU beddown.

4.1.4.2 MOB 1 Scenario Soils and Water Consequences

With the exception of the proposed new ramp area, the refueling truck parking yard, and hangar row road, the development would occur on previously disturbed areas within the Altus AFB boundary. The total disturbed area for the projects proposed as part of the KC-46A MOB 1 scenario would not exceed 80 acres (the area for new construction and additions/alterations). Design and construction methods, such as appropriate stormwater system controls, would be incorporated into the construction contract to reduce the potential for significant run-off impacts.

A tributary to the Ozark Irrigation Canal and a surface water drainage currently flow under the runway. Flow in these canals is intermittent and these are generally dry except when in use during the irrigation season. Portions of the tributary to the Ozark Canal would be contained in a concrete box culvert under the proposed parking ramp. Structures within the canal were evaluated for potential historical significance. No potential historic structures were identified. This canal is owned by the Bureau of Reclamation, and the stamped engineering plans and specifications for this project would require Bureau of Reclamation approval. This canal is protected from surface water flow by earthen levees, and site-specific standard construction practices would be utilized to protect the integrity of any water running through this canal.

For any projects that result in soil disturbance, the USAF would ensure that all construction activities are conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. The USAF would specify compliance with the stormwater discharge permit in the contractor construction requirements.

As referenced above, the Altus AFB SWPPP would be updated to describe the work to be completed as part of both scenarios and the activities that would be necessary to prevent soil erosion and sedimentation from the large amount of acreage proposed for development.

Based on the location of the proposed activities, as depicted on Figures 2-6 and 2-7, no sensitive groundwater resources or floodplains would be impacted within the project areas of the MOB 1 scenario.

4.1.5 Biological Resources

4.1.5.1 FTU Scenario Biological Resources Consequences

4.1.5.1.1 Vegetation

Potential impacts on vegetation resulting from implementation of the FTU scenario at Altus AFB are anticipated to be minor and short term because the majority of the demolition, construction, and renovation is planned to occur on previously disturbed areas. These projects would only affect small areas of improved and semi-improved land. Since these areas are already highly disturbed from ongoing routine maintenance and/or landscaping activities and are of low ecological value, there would be no significant impacts on vegetation resulting from FTU beddown.

4.1.5.1.2 Wildlife

Potential impacts on wildlife can be categorized as noise and habitat loss/alteration due to infrastructure changes, noise and visual disturbance associated with increased airfield and aircraft operations, and increased potential for bird/wildlife-aircraft strikes.

The areas proposed for development as a result of implementing the FTU scenario provide little wildlife habitat, and the projects would result in no significant impacts on wildlife populations.

Machinery associated with facility construction, renovation, and demolition would produce noise that would be perceived by wildlife near the activities (see Section 4.1.1, Noise). However, this noise would be localized, during daylight hours only, and short term. Wildlife in the area is already exposed to human-produced noise under baseline conditions. Therefore, construction-related noise would have a negligible impact on wildlife populations.

Airfield operations are anticipated to increase at Altus AFB. Noise impacts resulting from the increase in operations are anticipated to be minimal. The noise contours would increase only marginally and would not substantially increase the amount of land exposed to additional noise.

Increased operations would increase the potential for aircraft to strike birds (including migratory species) and other wildlife. The Altus AFB BASH Plan (Altus AFB 2012a) establishes procedures and actions to minimize the potential for aircraft to strike birds and other wildlife. Significant wildlife impacts are not anticipated to result from implementation of the KC-46A FTU scenario at Altus AFB.

4.1.5.1.3 Special-Status Species

Because no special-status species and/or designated critical habitat occur at Altus AFB, no significant impacts on special-status species are anticipated to result from the FTU scenario at Altus AFB.

4.1.5.1.4 Wetlands

Because there are no wetlands known to exist in any of the areas proposed for development under the KC-46A FTU scenario, implementation of this scenario at Altus AFB is not anticipated to directly affect any wetlands.

4.1.5.2 MOB 1 Scenario Biological Resources Consequences

4.1.5.2.1 Vegetation

The MOB 1 scenario at Altus AFB would have similar potential impacts on vegetation as described for the FTU scenario. The main difference between the MOB 1 and FTU scenario would be the loss of additional acres of semi-improved, open-space land. This development would be associated with construction of a new ramp and apron, hangars, and other associated facilities necessary to accommodate 36 additional KC-46A aircraft. The area is located west of Taxiway Charlie and is currently within the CZ of the airfield (see Figure 2-6). This area has low ecological quality because it is regularly mowed and treated to maintain vegetation as required by the Altus AFB BASH Plan (Altus AFB 2012a). Many of the construction, renovation, and demolition projects that are proposed as part of the MOB 1 scenario are currently located within developed or disturbed areas that provide little habitat value and would result in no significant impacts on vegetation.

4.1.5.2.2 Wildlife

Potential impacts on wildlife would be similar to those described in the FTU analysis and include minor noise increases and land disturbance due to infrastructure changes, the potential for visual disturbance associated with increased airfield and aircraft operations, and increased potential for bird/wildlife-aircraft strikes.

Many of the projects proposed as part of the MOB 1 scenario would occur in currently developed or disturbed areas that provide little wildlife habitat and would result in no significant impacts on wildlife populations. Some projects would occur in regularly maintained vegetated areas. In particular, construction of the new parking ramp and apron and associated facilities would encompass a large area of semi-developed airfield land.

Vegetated portions consist of maintained grasslands. These parcels are somewhat fragmented and are located near developed portions of the base with ongoing human activity. A variety of small wildlife probably use the vegetated areas periodically, and it is possible that larger species such as deer and coyote occasionally move through these areas. New construction for the fuel tanks, pumps, and hydrant system would occur adjacent to the golf course irrigation pond that may provide benefit to birds, mammals, and other wildlife when water is available.

Noise produced during construction, renovation, and demolition activities would be perceived by wildlife near the activities. However, this noise would be localized, during daylight hours only, and short term. Wildlife in the area are already exposed to frequent noise, and the activities would generally be restricted to daytime working hours. Therefore, construction-related noise would have a negligible impact on wildlife populations.

Airfield operations would increase over baseline conditions. Because the KC-46A is quieter than the KC-135, only minor noise increases would be anticipated. The noise contours would increase only marginally on and near the base and would not substantially increase the amount of land exposed to additional noise.

Similar to the analysis of the FTU beddown, increased operations would increase the potential for aircraft to strike birds and other wildlife in the air and on the runway. However, the Altus AFB BASH Plan establishes procedures and actions to minimize the potential for wildlife strikes. With continued adherence to the plan, there would be no significant impacts on wildlife populations due to aircraft strikes.

Overall effects on wildlife would be similar to those described for the FTU beddown. Significant wildlife impacts are not anticipated to result from implementation of the KC-46A MOB 1 scenario at Altus AFB.

4.1.5.2.3 Special-Status Species

Because no special-status species and/or designated critical habitat occur at Altus AFB, no significant impacts on special-status species are anticipated to result from the MOB 1 scenario at Altus AFB.

4.1.5.2.4 Wetlands

Because there are no known wetlands in any of the areas proposed for development under the KC-46A MOB 1 scenario, implementation of this scenario at Altus AFB is not anticipated to directly affect any wetlands.

4.1.6 Cultural Resources

4.1.6.1 FTU Scenario Cultural Resources Consequences

Actions associated with the proposed KC-46A FTU scenario include demolition of two buildings, renovation of two buildings, and additions and/or alterations to four buildings at Altus AFB. Building 285, a hangar, has been determined eligible for listing on the National Register of Historic Places (NRHP) by Altus AFB (97 AMW 2013). Oklahoma SHPO has concurred with the USAF's determination that modifications proposed for Building 285 as part of the KC-46A undertaking will not adversely affect the building's NRHP eligibility (letter from SHPO to USAF dated 29 July 2013), concluding the Section 106 consultation process.

No adverse impacts on archaeological historic properties are anticipated to result from implementing the FTU scenario. Ground-disturbing activities would occur on previously disturbed grounds. Those areas not already beneath previously modified surfaces have been surveyed for the presence of archaeological resources, and no historic properties have been located. It is unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, or addition. It is still possible that archaeological resources could be buried on Altus AFB. In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the National Historic Preservation Act (NHPA) and follow the standard operating procedures outlined in the Integrated Cultural Resource Management Plan (ICRMP) (Altus AFB 2009d). None of the other buildings associated with implementing the FTU scenario are considered eligible for the NRHP.

Indirect effects on cultural resources from population increase or visual intrusions are extremely unlikely. Under the FTU scenario, the population would increase by a small amount relative to the existing population at the base and in Altus. New construction would occur in the context of an active AFB, where changes in the infrastructure are common. There is no historic district, nor would the viewshed of the single historic property be affected by the proposed construction.

No modifications to buildings or ground-disturbing activities are anticipated at the auxiliary airfields. The noise environment would remain similar to baseline conditions. There would be no effect on historic properties at AMA, CSM, AFW, or LBB.

No adverse Section 106 impacts to tribal resources are anticipated. Consultation was initiated with 10 tribes. Eight tribes responded with no objections to the USAF's finding of no adverse impact. Additional efforts were made to contact the remaining two non-responsive tribes without success (see Table A-1 in Volume II, Appendix A, Section A.3). While the USAF values its relationship with all tribes and will continue to consult on other planning efforts or matters of known or potential interest to tribes, Section 106 consultation on the KC-46A FTU beddown proposed alternative at Altus AFB is now complete.

4.1.6.2 MOB 1 Scenario Cultural Resources Consequences

Implementing the MOB 1 scenario at Altus AFB would require demolition of eight buildings and a paved ramp area, renovation of three buildings and two paved areas, and additions/alterations of two buildings. Building 285, a hangar, is the only building identified as eligible for the NRHP, and it is proposed to be renovated as part of the MOB 1 scenario. Modifications proposed for Building 285 will not adversely affect the building's NRHP eligibility. The Oklahoma SHPO has concurred with the USAF's Finding of No Adverse Effect on historic properties (SHPO letter to USAF dated 29 July 2013; Volume II, Appendix A, Section A.5.1), concluding the Section 106 consultation process.

No impacts on archaeological historic properties are anticipated to result from implementing the MOB 1 scenario. Ground-disturbing activities would occur in previously disturbed contexts. Those areas not already beneath previously modified surfaces have been surveyed for the presence of archaeological resources, and no historic properties have been located. It is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, or addition or new construction. It is still possible that archaeological resources could be buried on Altus AFB. In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA and the standard operating procedures outlined in the ICRMP (Altus AFB 2009d).

Indirect effects on cultural resources from population increase or visual intrusions are extremely unlikely. Although the population at Altus AFB would double under the MOB 1 scenario, the resulting total should not affect historic properties. New construction would occur in the context of an active Air Force Base, where changes in the infrastructure are common. There is no historic district, nor would the viewshed of the single historic property be affected by the proposed construction.

Altus AFB consulted with the same tribes as described in the FTU scenario. No adverse Section 106 impacts to tribal resources are anticipated. Tribal responses for the MOB 1 scenario were the same as those described for the FTU scenario. Section 106 consultation on the KC-46A MOB 1 beddown proposed alternative at Altus AFB is now complete.

4.1.7 Land Use

4.1.7.1 FTU Scenario Land Use

4.1.7.1.1 Physical Development

The C&D projects proposed for the FTU scenario would occur in the developed areas of the base, predominantly near the airfield, industrial, and administrative portions of the base. The sites selected for the proposed projects either provide for requisite functional relationships or replace or augment existing base infrastructure. The proposed construction, demolition, and renovation generally align with the desired layout and organization of land use described in the base's 2003 General Plan.

Physical development on the base could result in short-term effects from construction activity on existing land use and activities. These typically include noise, dust, and traffic. The base would require contractors to use standard construction practices that would reduce construction-related effects, especially around housing and community areas, schools, and day care facilities. For example, these could include measures to control the hours for operating equipment, use of properly maintained equipment and sound-muffling fixtures, proper siting of equipment operating and staging areas (away from sensitive locations), selection of truck and delivery routes, and speed limits for construction and worker vehicles.

Implementation of the FTU scenario at Altus AFB would potentially require 144 housing units. Vacant housing on base can only fulfill a small portion of this demand. The demand could be met by vacant housing in the community or it could stimulate renovation or new development on base or in the community. Suitable land (about 60 acres) is available for new housing on the base on the edge of the existing housing area. Future development in the community would require approval from local jurisdictions (either the City of Altus or Jackson County). Approval of such development near Altus AFB would be based on conformance of the proposal with zoning and specific airfield compatibility requirements. Both the City of Altus and Jackson County have

cooperated with Altus AFB to control land use surrounding the base. Per the City's Unified Development Code, development proposals are evaluated relative to noise compatibility, accident potential (safety), and height of structures (that could obstruct air navigation) within 3 miles of the city limits. In addition, the Joint Land Use Study (JLUS) limits density in areas exposed to noise levels of 65 dB DNL and higher and recommends sound attenuation construction for new buildings in these areas. Existing land use controls have been successful in maintaining compatible land uses and limiting encroachment and development near the base.

The physical changes and daily activities on the ground would be confined to the base, thus the proposed on-base development would have minimal impact on off-base areas. Increased traffic through the Main Gate would use Falcon Road. There is little interface between the traffic on Falcon Road and adjacent land use. A cemetery, agricultural fields, and intermittent commercial uses near Falcon Road could experience some increase in noise and traffic at peak hours, but this would not change the suitability of these areas for the current uses. Traffic could also increase along East Tamarack Road and through residential areas along this road. The roadway design would accommodate traffic adequately, and the added traffic is not anticipated to conflict with these neighborhoods.

4.1.7.1.2 Aircraft Operations

This analysis includes an evaluation of the effect of proposed aircraft noise on land uses and any compatibility issues both on and off base. The USAF has participated in the Federal Interagency Committee on Urban Noise development of guidelines on noise levels and land use compatibility in the vicinity of airfields. Volume II, Appendix C, Section C.1.3.2, presents the noise compatibility guidelines for noise exposure and various land uses, along with recommended noise abatement measures to reduce incompatible exposure levels.

The total geographic area exposed to noise greater than or equal to 65 dB DNL resulting from FTU aircraft operations at Altus AFB is shown on Figure 4-1. Moderate noise increases on the base (reported in Table 4-2) would have a negligible impact on areas used for mission-related uses and support services. Neither of the two day care facilities nor the elementary school would experience adverse increases in noise exposure (remaining outside the 65 dB DNL contour). None of the family housing areas would experience incompatible noise levels above 65 dB DNL. The noise increase would primarily result from flightline aircraft maintenance activities performed near Building 285 and the number of aircraft operations proposed under the FTU scenario at night, with aircraft returning to the base after 10:00 P.M. at the end of their training sortie. This would be a minor impact on the base residential area.

The expected changes in noise exposure to off-base land uses are minimal. The proposed change in aircraft operations would result in exposure of about 580 additional acres to noise levels equal to or greater than 65 dB DNL outside the base, representing an increase of about 11 percent of affected off-base land. Most of this land is agricultural, with some existing homes (see Section 3.1.7.2). It is possible that a few homes would experience a shift in noise exposure level from just below 65 dB DNL to just above, or just below 70 dB DNL to just above 70 dB DNL. However, for most locations on the ground, increases would be less than 1 dB DNL (see Section 4.1.1.1) and imperceptible to underlying residents compared to current conditions. The increase would not cause new land use conflicts or compatibility concerns. A minor adverse impact on existing residential land use east of the City of Altus is a result of 17 additional persons being affected by the 65 dB DNL or greater noise contour.

4.1.7.1.3 Aircraft Operations – Auxiliary Airfields

KC-46A aircrews associated with the FTU scenario would use four different auxiliary airfields. However, because these airfields would only be used to practice aircraft operations with no associated ground level development and the noise resulting from aircraft operations noise at three of the four would be less than 0.5 dB, only Clinton-Sherman Air Industrial Park (CSM) has been included in this evaluation. Projected levels of use could increase the area exposed to noise levels of 65 dB DNL or greater by about 5 acres at CSM. The area surrounding CSM is used for agriculture. Compared to the 1,607 acres currently exposed to noise levels from other aircraft, this increase would be inconsequential and imperceptible. No change in noise exposure for areas within the CSM boundary is projected. Overall, no significant impacts on land use at CSM are anticipated to result from aircraft operations associated with the FTU scenario at Altus AFB.

4.1.7.2 MOB 1 Scenario Land Use

4.1.7.2.1 Physical Development

The impacts on land use resulting from physical development associated with implementation of the MOB 1 scenario at Altus AFB are similar to those associated with the FTU scenario, as described in Section 4.1.7.1. However, implementation of the MOB 1 scenario would potentially require approximately 1,870 housing units. Housing on base, in the local community, and outside of Jackson County would be required to meet this demand. As described in Section 4.1.7.1.1, new private residential development would require approval from local jurisdictions.

Potential indirect effects from construction on land uses near the base are similar to those described in Section 4.1.7.1.1. The projected increase in base population would increase the number of persons driving in and out of the base each day. Increased traffic on local access roads could cause minor indirect impacts on adjacent land uses due to congestion and localized noise increases during peak commute hours. Longer wait times to access driveways or side roads may cause intermittent inconvenience but would not change the current uses. Additional traffic on major streets could benefit commercial use.

4.1.7.2.2 Aircraft Operations

Impacts on land use resulting from the airfield operations associated with the MOB 1 scenario at Altus AFB would be similar to those described for the FTU scenario in Section 4.1.7.1.2. Aircrews associated with the MOB 1 scenario would fly more operations than FTU aircrews, but fewer would be conducted at night (10 percent). The increase in operations would result in approximately 155 additional off-base acres exposed to noise levels equal to or greater than 65 dB DNL compared with baseline conditions and 429 fewer off-base acres compared with the FTU scenario at Altus AFB (see Table 4-2). None of the on-base housing area is expected to be exposed to incompatible noise levels resulting from the proposed MOB 1 aircraft operations.

Noise projected to emanate off Altus AFB from aircraft operations associated with the MOB 1 scenario is expected to be similar to the off-base noise associated with the FTU scenario, with similar minor impacts on a few surrounding residences located in agricultural areas and areas east of the City of Altus (see Section 4.1.7.1.2). Aircrews operating KC-46A aircraft would proportionally increase use of the east and west pattern routes. Residents underlying these flight tracks would likely notice the increase in frequency of overflights, although the sound level for the KC-46A would be lower than the KC-135. Disturbance from overflights may annoy some residents (see Section 3.1.7.2), but would not cause conditions that make affected areas unsuitable for residential use based on average noise levels and recommended compatibility guidelines.

4.1.8 Infrastructure

Refer to Section 3.1.8 for a description of existing infrastructure system capacities and conditions at Altus AFB. Table 2-4 provides changes in population due to implementation of the FTU scenario and Table 2-7 indicates changes in population due to implementation of the MOB 1 scenario at Altus AFB. These changes in population and proposed development were used to determine potential impacts on infrastructure. For each scenario, the maximum demand or impact on capacity was calculated for the potable water, wastewater, electric and natural gas systems based on the change in population. To identify maximum demand or impact on these systems, any change in population was assumed to live on base. For the assessment of the transportation infrastructure, any change in population was assumed to reside off base.

4.1.8.1 FTU Scenario Infrastructure Consequences

4.1.8.1.1 Potable Water System

The City of Altus and Jackson County averaged 91 gallons per day (GPD) of per capita water demand in 2012 (OWRB 2013). Using that amount as a planning factor, the change in population associated with the FTU scenario would create an additional water use demand of 0.08 million gallons per day (MGD). Implementing the FTU scenario would increase average daily demand from 30 to 37 percent and peak use from 51 to 59 percent.

4.1.8.1.2 Wastewater

The USEPA estimates that the average person generates approximately 100 GPD of wastewater between showering, toilet use, and general water use (USEPA 2013c). Using this amount as a planning factor along with the change in population, the FTU scenario would increase wastewater discharge from Altus AFB by 0.09 MGD. This would increase average daily discharge from 4 to 6 percent of the city's Wastewater Treatment Plant (WWTP) capacity and would increase peak discharge from 6 to 8 percent of the city's WWTP capacity. This increase in additional wastewater discharge for average or peak use for the FTU scenario would be within the supply and capacity of the City of Altus WWTP. As noted in Section 3.1.8.2, portions of the on-base wastewater collection and distribution system have been improved over the last 10 years.

4.1.8.1.3 Stormwater System

The FTU scenario would require demolition of facilities and construction of new facilities. This would take place within the existing developed base flightline and cantonment areas. Table 2-3 identifies the projects associated with the FTU scenario; the total potential disturbed area associated with these projects would not exceed 5 acres (new construction and additions/alterations). All other construction associated with the FTU scenario would occur on improved areas. With the exception of flood-prone areas in the northeast and southwest corners of the base, the stormwater system is reported to perform adequately. The FTU scenario would not require the construction of new facilities in either of the flood-prone areas. Implementation of the FTU scenario would not significantly increase stormwater run-off from the base.

During the short-term construction period for the FTU scenario, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures.

The existing Altus AFB SWPPP and National Pollutant Discharge Elimination System (NPDES) Stormwater Multi-Sector General Permit for Industrial Activities would be updated to include measures to avoid and minimize the potential impacts that could occur during the short-term construction phase of proposed new and renovated facilities or during operations under the FTU scenario. In addition, the requirements of the Energy Independence and Security Act (EISA) of 2007 would be followed to maintain or restore, to the maximum extent practical, the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow.

4.1.8.1.4 Electrical System

To estimate the change in residential electrical use associated with personnel and their dependents, data from the U.S. Energy Information Administration (USEIA) were used to identify that residential consumers averaged about 14.66 megawatt hours (MWH) per person per year (1,667,223 users) in Oklahoma in 2011 (the best available statistics), with a total of about 24,425,027 MWH consumed in 2011 (USEIA 2011). Using that amount as a planning factor along with the change in population, the FTU scenario would increase state annual residential demand for electricity by 12,791 MWH per year. This represents less than 1 percent of the annual state-wide usage in 2011. Assuming the change in population resides on Altus AFB and the population uses electricity at the 2011 residential average rate of 0.041 MWH per person per day, the FTU scenario would increase daily use of electricity by 35.04 MWH per day. The FTU scenario would increase average daily demand from 12 to 16 percent of base system capacity and would increase peak demand from 15 to 18 percent of base system capacity.

4.1.8.1.5 Natural Gas System

To estimate the additional residential natural gas use associated with personnel and their dependents, data from the USEIA were used to identify that residential consumers averaged about 0.07 million cubic feet (MMcf) per person per year (922,240 users) in Oklahoma in 2011, with a total of about 61,387 MMcf consumed (USEIA 2011). Using that amount as a planning factor along with the change in population, the FTU scenario would increase state annual residential demand for natural gas by 58.1 MMcf per year. This represents less than 1 percent of the total state-wide usage in 2011. Assuming the change in population reside on Altus AFB and the population uses electricity at the 2011 residential average rate of 0.19 thousand cubic feet (Mcf) per person per day, the FTU scenario would increase the daily use of natural gas by 160 Mcf per day. The FTU scenario would result in an increase of average daily natural gas use from 9 to 14 percent of base system capacity and an increase of peak use from 23 to 28 percent of base system capacity.

4.1.8.1.6 Solid Waste Management

Solid waste generated from the proposed demolition activities would consist of building materials such as large pieces of concrete, metals (e.g., conduit, piping, and wiring), lumber, and other nonhazardous debris. These activities would lead to a requirement for C&D debris to be recycled or taken to the City of Altus Landfill or other landfills in the region.

Using methodology developed by the USEPA (USEPA 2009b) to determine the amount of C&D debris, it is estimated that implementation of the FTU scenario would result in approximately 3,228 tons of C&D debris. Disposal of the debris would be through an integrated C&D debris diversion approach or removal to landfills. The integrated C&D debris diversion approach includes reuse, recycling, volume reduction/energy recovery, and similar diversion actions. The

DoD has set a target C&D debris diversion rate of 60 percent by Fiscal Year 2015 (DoD 2012). Applying this target diversion rate, approximately 1,937 tons of C&D debris would be diverted for reuse or recycling and approximately 1,292 tons would be placed in the City of Altus Landfill or other landfills in the region.

This would be a potentially short-term, minor, adverse impact that the landfill could absorb, as the City of Altus Landfill accepts an average of 36,100 tons of waste annually, including C&D waste. The overall capacity of the landfill is 2 million tons.

Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, asbestos-containing material (ACM), lead-based paint (LBP), or other hazardous components, would be managed in accordance with Air Force Instruction (AFI) 32-7042, "Waste Management."

4.1.8.2 FTU Scenario Transportation Consequences

Implementation of any of the facilities and infrastructure projects associated with the FTU scenario at Altus AFB would require the delivery of materials to and removal of construction-related debris from demolition, renovation, and new construction sites. Trucks associated with these activities, along with construction crews, would either access the base via the Main Gate or the South Gate. Construction-related traffic would comprise only a small portion of the total existing traffic volume in the area and at the base. Increased traffic associated with these activities could contribute to increased congestion at the entry gates, delays in the processing of access passes, and degradation of the affected road surfaces.

Additionally, intermittent traffic delays and temporary road closures could result in the immediate vicinity of the facility and infrastructure project sites. Potential congestion impacts could be avoided or minimized by scheduling truck deliveries outside of the peak inbound traffic time and by using the South Gate instead of the Main Gate. Also, many of the heavy construction vehicles would be driven to the site and kept on base for the duration of the C&D activities, resulting in relatively few additional trips. Traffic delays would be temporary in nature, ending once construction activities have ceased. As a result, no long-term or significant impacts on transportation infrastructure are anticipated.

Implementation of the KC-46A FTU scenario at Altus AFB would result in an increase in on-base mission personnel, which would equate to about a 12 percent increase in daily commuting traffic to and from the base. In addition to the increase in personnel, there would also be a small increase in dependent and commercial traffic. This assumes that all personnel and dependents live off base, work standard workdays, and drive individually to the base. For the purposes of this analysis, it was assumed that the additional students associated with the KC-46A FTU scenario would be housed on base and would not have an impact on daily traffic. The small increase in base mission personnel could increase congestion and queuing at the Main Gate during morning and evening rush hours. To minimize this, the base could adjust the schedule of operations to accommodate this increase, upgrade the Main Gate (e.g., provide additional lanes) and/or provide additional personnel at the gate to process security checks during the peak hours. Regional access roads and the on-base road network have adequate capacity to absorb the small amount of additional traffic without major impacts on traffic flow, circulation, or level of service.

4.1.8.3 MOB 1 Scenario Infrastructure Consequences

4.1.8.3.1 Potable Water System

Based on the water demand planning factor for the City of Altus and Jackson County in Section 4.1.8.1.1 and the change in population associated with the MOB 1 scenario, there would be an additional water demand of 0.54 MGD. The MOB 1 scenario would increase average daily demand from 30 to 82 percent and peak use demand from 51 to 103 percent. The MOB 1 scenario would require the system to operate at over full contracted capacity during peak use months, when base water pressure is at its lowest point. This evaluation is based on the contract amount with City of Altus, at 1.03 MGD. The Altus AFB water system has the capacity to accommodate 2 MGD.

4.1.8.3.2 Wastewater

Implementation of the MOB 1 scenario would increase wastewater discharge to 0.59 MGD based on the USEPA wastewater planning factor in Section 4.1.8.2.2 and the change in population. The MOB 1 scenario would increase average daily discharge from 4 to 19 percent and the highest reported peak discharge from 6 to 21 percent. This increase in additional wastewater discharge for average or peak use for the MOB 1 scenario would be within the capacity of the City of Altus WWTP.

As noted in Section 3.1.8.2, portions of the on-base wastewater collection system have been improved in the last 10 years.

4.1.8.3.3 Stormwater System

Implementation of the MOB 1 scenario would not require construction in either of the flood-prone areas. The facilities proposed for renovation are also not located in these areas.

Table 2-6 lists the projects associated with the MOB 1 scenario; the total potential disturbed area associated with these projects would not exceed 80 acres (new construction and additions/ alterations). The largest area of disturbance would be associated with the new aircraft parking, taxiway, and ramp space areas proposed for undeveloped land within the existing flightline area.

During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales, and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures. An SWPPP update would be required and the requirements of the EISA would be followed to maintain or restore, to the maximum extent practical, the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow.

During the short-term construction period for the MOB 1 scenario, the contractor would be required to comply with the new SWPPP, applicable statutes, standards, regulations, and procedures regarding stormwater management during construction.

4.1.8.3.4 Electrical System

Using the USEIA planning factor in Section 4.1.8.1.4 and the change in population, implementation of the MOB 1 scenario would increase the state annual residential demand for electricity by 86,383 MWH per year. This represents less than 1 percent of the state-wide usage in 2011. Assuming the change in population resides on Altus AFB and the population uses

electricity at the 2011 residential average rate of 0.041 MWH per person per day, implementation of the MOB 1 scenario would increase the average daily use of electricity by 236.65 MWH per day. The MOB 1 scenario would increase average daily demand from 12 to 35 percent of base system capacity and would increase peak demand from 15 to 37 percent of base system capacity.

4.1.8.3.5 Natural Gas System

Using the USEIA planning factor in Section 4.1.8.1.5 and the change in population, implementation of the MOB 1 scenario would increase state annual residential demand for natural gas by 393 MMcf per year. This represents less than 1 percent of the total state-wide usage in 2011. Assuming the change in population resides on Altus AFB and the population uses natural gas at the 2011 residential average rate of 0.19 Mcf per person per day, implementation of the MOB 1 scenario would increase daily natural gas use by 1,076 Mcf. The MOB 1 scenario would increase average daily natural gas demand from 9 to 43 percent of base capacity and would increase peak demand from 23 to 57 percent of base capacity.

4.1.8.3.6 Solid Waste Management

Implementation of the MOB 1 scenario would be anticipated to generate approximately 49,028 tons of C&D debris for recycling or removal to landfills. Application of the 60 percent DoD diversion target rate for C&D debris would result in approximately 29,417 tons being reused or recycled and approximately 19,611 tons being placed in the City of Altus Landfill or other landfills in the region.

Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, LBP, or other hazardous components, would be managed in accordance with AFI 32-7042, “Waste Management.”

4.1.8.3.7 Transportation

Because the demolition, renovation, and construction projects would require more total square footage than the projects associated with the FTU scenario, the number of construction-related truck trips and number of construction workers, along with duration of the time to complete the projects, would be greater.

Implementation of the KC-46A MOB 1 scenario at Altus AFB would result in an approximate increase of 54 percent in daily commuting traffic to and from the base. In addition to the increase in personnel, there would also be an increase in dependent and commercial traffic. This assumes that all personnel and dependents live off base, work standard workdays, and drive individually to the base. This increase in base mission personnel is likely to increase congestion and queuing at the Main Gate during morning and evening rush hours.

On-base road network congestion would also increase, affecting traffic circulation; however, no significant impacts are expected. To minimize the potential for adverse impacts, the base could adjust the schedule of operations to accommodate this increase, upgrade the Main Gate (e.g., provide additional lanes), and/or provide additional personnel at the gate to process security checks during the peak hours. It is expected that the affected regional access roads have additional capacity to absorb additional traffic without a major impact on the level of service or flow of traffic.

4.1.9 Hazardous Materials and Waste

4.1.9.1 FTU Scenario Hazardous Materials

The USAF has developed a Hazardous Materials Management Plan (HMMP) for the KC-46A program. This plan details the strategy for integrating hazardous materials management into the KC-46A system. The USAF will actively pursue efforts to minimize or eliminate the use of various materials, including hexavalent chromium, cadmium, and halon. The KC-46A will be the first aircraft in the Air Mobility Command (AMC) inventory to be completely free of ozone depleting substances (ODS), including from handheld fire extinguishers. The corrosion protection program for the KC-135 uses hexavalent chromium on both the interior and exterior. After the first 11 aircraft, the KC-46A corrosion control program will only use hexavalent chromium on the interior of the aircraft. Specific cadmium plating alternatives are currently being implemented for use on KC-46A aircraft. These include zinc-nickel plating in lieu of cadmium for plating on bearings and bushings when required. Standard materials such as cleaning solvents, sealants, adhesives, and paints may be required for routine maintenance and repairs. The preference will be to use the least hazardous material when alternates are available.

Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through Hazardous Materials Pharmacy (HAZMART) are adequate to handle the changes anticipated with the addition of eight KC-46A aircraft for the FTU scenario, but would be expanded to meet the increased use.

4.1.9.1.1 Aboveground and Underground Storage Tanks

The addition of KC-46A aircraft at Altus AFB would increase the maximum daily consumption of JP-8. The increase in fuel consumption would be supported by the current infrastructure at the base. Some of the new and remodeled facilities would require the addition of new aboveground storage tanks (ASTs), underground storage tanks (USTs), and hazardous materials and hazardous waste containers. The new and remodeled facilities would be constructed with berms and drains leading to oil-water separators (OWSs), if required, to contain releases of petroleum products. The Altus AFB Integrated Contingency Plan (Altus AFB 2012c) would subsequently need to be amended to capture any changes in facility design, construction operation, or maintenance that materially affect the potential for a discharge.

4.1.9.1.2 Toxic Substances

Demolition, renovation, and addition/alteration projects are planned as part of the Altus AFB FTU scenario. All but one of the buildings (Building 518) that would be affected by these projects has had ACMs positively identified inside. Volume II, Appendix E, Table E-1, contains a list of buildings proposed for modification under the FTU scenario and their potential to contain ACMs.

Prior to initiating the projects, all ACMs would be identified through sampling and analysis of building materials for asbestos. Exposed friable asbestos would be removed in accordance with applicable Federal, state, local, and USAF rules and regulations. Before initiating the ACM removal work, agency notifications would be completed. No work on an ACM project would be conducted unless it is performed by persons with current certificates of training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of at a waste disposal site authorized to accept such waste. Additionally, the handling and disposal of ACM wastes would be performed in accordance with the Altus AFB Asbestos Management and Operations Plan (Altus AFB 2010c) and in compliance with Federal, state, and local regulations. Transport and disposal documentation records, including signed manifests, would also be required.

LBP survey data were not obtained for any of the buildings that would be demolished, renovated, or altered (or are included as options) as part of the proposed action. Based on their years of construction, a few buildings that are proposed or are options for renovation, alteration, or demolition have the potential for containing LBP. Volume II, Appendix E, Table E-1, contains a list of buildings proposed for modification under the FTU scenario and their potential to contain LBP. According to standard operating procedures, LBP surveys are conducted prior to any renovation or demolition activities. Demolition of structures known to contain LBP would be conducted in accordance with applicable regulations. Proper disposal of any resulting lead-containing wastes would also be conducted in accordance with Federal regulations, including the Toxic Substances Control Act and the Occupational Safety and Health Act. Further, these wastes would be accompanied by a waste manifest and disposed of at an approved off-base disposal facility.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the KC-46A FTU scenario at Altus AFB, and long-term benefits from removal of toxic substances are anticipated.

4.1.9.2 Hazardous Waste Management

Altus AFB would continue to generate hazardous wastes during various operations and maintenance activities. Hazardous waste disposal procedures, including off-base disposal procedures, are adequate to handle changes in quantity and would remain the same. Hazardous waste anticipated to be generated by the KC-46A FTU scenario would be consistent with waste generated by the KC-135. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. Operations involving hexavalent chromium, cadmium, and halon (i.e., an ODS) have been eliminated or minimized to the extent possible (Boeing 2013). Hazardous materials such as trichloroethane (TCE) have available alternates and will not be required for the KC-46A. No new hazardous materials would be added that exceed Altus AFB's current hazardous waste processes.

4.1.9.3 Environmental Restoration Program

Modifications and/or additions to existing buildings for the FTU scenario at Altus AFB under the proposed action would occur in proximity to existing Environmental Restoration Program (ERP) sites. The USAF would coordinate with the restoration office before any modifications are initiated. Although formal construction waivers are not required, the USAF does require reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current Environmental Impact Analysis Process (EIAP) practices as specified in AFI 32-7061, AFI 32-7020, and AFI 32-1021.

The USAF would ensure that modifications are coordinated with ongoing remediation or investigation activities at any ERP site. However, if existing plans and standard construction practices are followed, there would be no anticipated impacts on these ERP sites. During C&D activities, there is the potential to encounter contaminated soil and groundwater in areas associated with ERP sites. There is also the possibility that undocumented contaminated soils from historical fuel spills may be present. If encountered, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable Federal, state, and local regulations; AFIs; and base policies. If soil or groundwater contaminants are encountered during C&D activities, health and safety precautions, including worker awareness training, may be required.

The FTU scenario would require the addition of a tail enclosure and tool crib expansion to Building 285 and the addition of a tail enclosure and fuel cell expansion to Building 518. Both Building 285 and Building 518 are located over Ground Water Monitoring Unit (GWMU) 1, which has TCE groundwater contamination and is currently undergoing remediation efforts (Bitney 2013). Past construction has occurred at the base in areas within GWMU 1. The depth to groundwater across the base is approximately 8 to 10 feet below the ground (Bitney 2013). Based on the relatively shallow water table, it is possible that groundwater may be encountered during construction. Past experience indicates that it is unlikely the GWMU 1 groundwater has concentrations that would cause it to be classified as a hazardous waste. Institutional controls at Altus AFB that apply to construction include considering the potential of vapor intrusion if building or digging in areas of high groundwater VOCs and prohibition of groundwater use.

The FTU scenario would require the addition of a Squadron Operations/Aircraft Maintenance Unit to Building 193 and the construction of a hydrant pit about 500 feet east of Building 193. Both the building and hydrant pit are located above GWMU 2, which has TCE groundwater contamination and is currently undergoing remediation efforts (Bitney 2013). The same institutional controls that apply to GWMU 1 also apply to GWMU 2.

The FTU scenario would require the addition of a Flight Training Center within the footprint of current Building 171. There are two existing groundwater monitoring wells (WL343 and WL415) near the proposed construction area that may need to be abandoned and replaced.

4.1.9.4 MOB 1 Scenario Hazardous Materials

Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through HAZMART are adequate to handle the changes anticipated with implementation of the MOB 1 scenario but would be expanded to meet the increased use.

4.1.9.4.1 Aboveground and Underground Storage Tanks

The addition of KC-46A aircraft at Altus AFB would increase the maximum daily consumption of JP-8. The increase in fuel consumption would be supported by the current base infrastructure and proposed construction of fuel tanks, pumps, and a hydrant system. Some of the new and remodeled facilities would require the addition of new ASTs, USTs, and hazardous materials and hazardous waste containers. The new and remodeled facilities would be constructed with berms and drains leading to OWSs, if required, to contain releases of petroleum products. The Altus AFB Integrated Contingency Plan (Altus AFB 2012c) would subsequently need to be amended to capture any changes in facility design, construction operation, or maintenance that materially affect the potential for a discharge.

4.1.9.4.2 Toxic Substances

The primary difference between the KC-46A FTU and MOB 1 scenarios at Altus AFB would be the additional buildings that are proposed to be affected under the MOB 1 scenario. The same plans, provisions, and requirements for ACM and LBP described for the FTU scenario would apply to the MOB 1 scenario. Volume II, Appendix E, Table E-2, contains a list of buildings that would be affected by the projects, their years of construction, and their potential for ACMs and LBP to be present.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the KC-46A MOB 1 scenario at Altus AFB, and long-term benefits from removal of toxic substances are anticipated.

4.1.9.5 Hazardous Waste Management

Altus AFB would continue to generate hazardous wastes during various operations and maintenance activities. Hazardous waste disposal procedures, including off-base disposal procedures, are adequate to handle changes in quantity and would remain the same. The wastes proposed to be generated by the KC-46A MOB 1 scenario are consistent with waste generated by the KC-135 mission. It is anticipated that the amount of hazardous waste generated will be comparable or less than the KC-135 mission (Boeing 2013). Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. Operations involving hexavalent chromium, cadmium, and halon have been eliminated or minimized to the extent possible (Boeing 2013). Hazardous materials such as TCE have available alternates and will not be required for the KC-46A. No new hazardous materials would be added that exceed Altus AFB's current hazardous waste processes.

4.1.9.6 Environmental Restoration Program

Modifications and/or additions to existing buildings for the MOB 1 scenario at Altus AFB would occur in proximity to existing ERP sites. The USAF would coordinate with the restoration office before any modifications are initiated. Although formal construction waivers are not required, the USAF does require reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current EIAP processes, as specified in AFI 32-7061.

The USAF would ensure that modifications are coordinated with ongoing remediation or investigation activities at any ERP site. However, if existing plans and standard practices are followed, there would be no anticipated impacts on these ERP sites. During C&D activities, there is the potential to encounter contaminated soil and groundwater in areas associated with ERP sites. There is also the possibility that undocumented contaminated soils from historical fuel spills may be present. If encountered, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable Federal, state, and local regulations; AFIs; and base policies. If soil or groundwater contaminants are encountered during C&D activities, health and safety precautions, including worker awareness training, may be required.

Implementation of the KC-46A MOB 1 scenario would require the addition of an interior vault to Building 369. This building overlies GWMU 1, which has TCE groundwater contamination and is currently undergoing remediation efforts (Bitney 2013). Past construction has occurred at the base in areas within GWMU 1. The depth to groundwater across the base is approximately 8 to 10 feet below ground surface (bgs) (Bitney 2013). Based on the relatively shallow water table, it is possible that groundwater could be encountered during construction. Past experience indicates that it is unlikely the GWMU 1 groundwater has concentrations that would cause it to be classified as a hazardous waste. Institutional controls at Altus AFB that apply to construction include considering the potential of vapor intrusion if building or digging in areas of high groundwater VOCs and prohibition of groundwater use.

The proposed action would require the construction of approximately 50 acres of ramp space and aerospace ground equipment apron. The southern part of the ramp and apron is located over Solid Waste Management Unit No. 2. The site is known as the Fire Protection Training Area (FT005) and is located along an intermittent drainage ditch near the 16th green of the base golf course (Altus AFB 2013). FT005 was active from 1956 to 1960. Waste fuels, including oil, solvents, and thinners, were used to ignite the fires. As a result of these activities, the underlying groundwater is contaminated with VOCs at concentrations slightly above USEPA maximum contaminant levels.

Long-term groundwater monitoring continues to occur at the site, but no active remediation is planned. While no further corrective actions were planned for FT005, the site was included in the 2012 Performance Based Remediation contract. Soil with dioxin concentrations above 50 parts per trillion will be removed or treated to meet residential land use standards.

FT005 is located in the extreme northern part of GWMU 2, which has TCE groundwater contamination and is currently undergoing remediation efforts (Bitney 2013). The approximate southern one-third of the ramp and apron would overlie GWMU 2. Groundwater at Site FT005 is located about 6 to 10 feet bgs. The same institutional controls that apply to GWMU 1 also apply to GWMU 2. There are about 14 existing groundwater monitoring wells (WL006, WL009, WL102, WL103, WL106–WL108, WL229, WL517, WL518, WL697, and WL765–WL767) located within or near the proposed ramp and apron construction area that may need to be abandoned and replaced.

The MOB 1 scenario would require C&D activities within the footprint of the fuel tanks, pumps, and hydrant system, which includes two ASTs (Structures 554 and 557), two fuel stands (Structures 564 and 565), and two buildings (Buildings 551 and 563). Three groundwater monitoring wells (WL346–WL348) within the proposed construction area may need to be abandoned and replaced.

As part of the new ramp and apron construction, existing concrete will be demolished and replaced. A substantial volume of construction debris and demolition waste could impact local and regional waste facilities/landfills. Further investigation and consideration of waste diversion strategies are needed to determine the degree of impact on solid waste facilities.

4.1.10 Socioeconomics

4.1.10.1 FTU Scenario Socioeconomics Consequences

4.1.10.1.1 Population

The current personnel at Altus AFB and the change projected to be necessary to support the KC-46A FTU scenario are provided in Table 2-4. Implementation of the FTU scenario at Altus AFB would potentially add up to 578 people to Jackson County, resulting in a 2.2 percent increase in the county population. This potential increase is based on the assumption that the 252 DoD civilians, 20 part-time Reservists, and 23 contractors would be from Jackson County and areas surrounding the base.

4.1.10.1.2 Economic Activity (Employment and Earnings)

As shown in Table 2-4, implementation of the FTU scenario at Altus AFB would increase the work force assigned to Altus AFB by 619 personnel. The personnel would comprise 144 full-time military, 200 students, 252 DoD civilians, 20 part-time Reservists, and 23 contractors. The addition of 619 people to Altus AFB would increase on-base jobs from 3,891 to 4,510, or an approximate 15.9 percent increase. The Impact Analysis for Planning (IMPLAN) model calculates that approximately 375 indirect and induced jobs in the ROI would result from implementation of the FTU scenario, with most of the jobs being created in industries such as food services, retail stores, and individual and family services. With a 2012 unemployment rate of 4.7 percent, it is expected that the local labor force would be sufficient to fill these new jobs without a migration of workers into the area.

Construction activities, in general, provide economic benefits to the surrounding areas through the employment of construction workers, as well as the purchase of materials and equipment. These construction activities would be temporary and would only provide a limited economic benefit. For every $100 million spent on construction of other new nonresidential structures in the ROI, an estimated 1,403 direct, indirect, and induced jobs would be created (MIG 2012). The USAF estimates that approximately $52 million in construction and $11 million in operating and maintenance (O&M) expenditures would be required to implement the FTU scenario at Altus AFB. The total amount of construction and O&M expenditures could generate approximately 909 jobs primarily within the construction industry or related industries, including food services and retail stores (MIG 2012). Since the construction activities are scheduled over several years and it would be possible for a single worker to work on multiple projects, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs. The indirect and induced income associated with construction expenditures is estimated to be approximately $4 million. These jobs, and the related income, would be temporary during the construction activity.

4.1.10.1.3 Housing

Under the assumption that only DoD civilians, part-time Reservists, and contractors would be from the local population (as stated in Section 4.1.10.1.1) and that all incoming full-time military personnel would require off-base housing, there would be a potential need for 144 housing units. Under these assumptions and based on the number of vacant homes described in Section 3.1.10.1.3, the housing market in the ROI would be anticipated to support this need.

All 200 projected pilot and boom operator/loadmaster students, while assigned to the FTU, would be assumed to be in transient status. It would also be assumed that 180 of these 200 students would be lodged in either on- or off-base facilities as available. Only 20 of these 200 students would be assumed to be non-prior service Airmen, and would thus be required to live in an on-base dormitory. Therefore, under the FTU scenario at Altus AFB, there would be a potential need for 180 lodging units either on or off base and 20 dormitory units on base to support the average daily student load of 200. Based on the current and projected capacities of both on- and off-base lodging and on-base dormitories, there would be adequate facilities available to support the 200 students.

4.1.10.1.4 Education

As shown in Table 2-4, the overall change in the number of military dependents and family members accompanying additional full-time USAF personnel under the FTU scenario would be approximately 234 persons. The total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time military personnel only. The total number of children was estimated at 1.5 times 65 percent of full-time military personnel, since it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 140 military dependents would be of school age. Therefore, approximately 140 students would be anticipated to enter any of the six school districts in Jackson County. Based on the number of school districts and schools in the county, as well as current class sizes, the schools in Jackson County would have the capacity to support the incoming students. The students entering the local schools would be of varying ages and would be expected to live in different parts of Jackson County, with the majority in the City of Altus, where there appears to be adequate housing and education facilities. However, space available for new enrollment depends on the timing of the relocation and which schools the students would attend. A large influx of students over a short period could result in capacity constraints and could require additional personnel.

4.1.10.1.5 Public Services

Jackson County represents a large community with police, fire, and other services. Implementation of the FTU scenario would add up to approximately 578 USAF-related personnel and dependents, which represents a 2.2 percent increase in the existing county population. Demand for public services in Jackson County has increased for several years, and this demand would continue to increase with the projected change in the population.

4.1.10.1.6 Base Services

Base services such as medical facilities, child development centers (CDCs), dining, fitness, and Visiting Quarters have adequate infrastructure and staffing to support active-duty, students, and dependents projected under the FTU scenario.

4.1.10.2 MOB 1 Scenario Socioeconomics Consequences

4.1.10.2.1 Population

The current personnel at Altus AFB and the projected change anticipated to support the KC-46A MOB 1 scenario are provided in Table 2-7. Implementation of the MOB 1 scenario would potentially add up to 4,917 people to Jackson County, resulting in an approximate 18.6 percent increase in the county population. This potential increase is based on the assumption that the 29 DoD civilians, 930 part-time Reservists, and 20 contractors would be from Jackson County and areas surrounding the base.

4.1.10.2.2 Economic Activity (Employment and Earnings)

As shown in Table 2-7, implementation of the MOB 1 scenario at Altus AFB would increase the work force assigned to Altus AFB by 1,922 total personnel. The personnel would comprise 1,873 full-time military, 29 DoD civilians, and 20 contractors. The addition of 1,922 personnel at Altus AFB would increase on-base jobs from 3,891 to 5,813, an approximate 49 percent increase. The IMPLAN model calculates that approximately 662 indirect and induced jobs in the ROI would result from implementation of the MOB 1 scenario, with most of the jobs being created in industries such as food services, retail stores, individual and family services, and offices of physicians and other health practitioners. With a 2012 unemployment rate of 4.7 percent (the most recent annual average for labor force data by county), it is expected that the local labor force would be sufficient to fill these new jobs without a migration of workers into the area.

Construction activities, in general, provide economic benefits to the surrounding areas through the employment of construction workers, as well as the purchase of materials and equipment. These construction activities would be temporary and would only provide a limited amount of economic benefit. For every $100 million spent on construction of other new nonresidential structures in the ROI, an estimated 1,403 direct, indirect, and induced jobs would be created. The USAF estimates that approximately $400 million in construction expenditures would be associated with implementation of the MOB 1 scenario at Altus AFB. This amount could generate approximately 5,628 jobs primarily within the construction industry or related industries, including food services, retail stores, and architectural and engineering services (MIG 2012). Since the construction activities are scheduled over several years and it would be possible for a single worker to work on multiple projects, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs without a migration of workers into the area. The indirect and induced income associated with construction expenditures is estimated to be approximately $24 million. These jobs, and the related income, would be temporary during the construction activity.

4.1.10.2.3 Housing

Under the assumption that only DoD civilians, part-time Reservists, and contractors would be from the local population (as stated in Section 4.1.10.2.1) and that all incoming full-time military personnel would require off-base housing, there would be a potential need for 1,873 off-base housing units. Prior to implementing the MOB 1 scenario, the USAF would complete a Housing Requirements and Market Analysis (HRMA) to determine the number of suitable and available housing units within the HRMA-defined market area. The housing market in the ROI and surrounding communities and counties would be able to support this need.

4.1.10.2.4 Education

As shown in Table 2-7, the overall change in the number of military dependents and family members accompanying additional USAF personnel associated with the MOB 1 scenario would be approximately 3,044 persons. The total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time military personnel only. The total number of children was estimated at 1.5 times 65 percent of full-time military personnel, since it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 1,826 military dependents would be anticipated to be of school age. Therefore, approximately 1,826 students would be anticipated to enter any of the six school districts in Jackson County. Based on the number of school districts and schools in the county, as well as class size for the state, the schools in the county would have the capacity to support the incoming population. The students entering the local schools would be of varying ages and would be expected to live in different parts of Jackson County. Space available for new enrollments depends on the timing of the relocation and which schools the students would attend. A large influx of students over a short period would result in capacity constraints and would require additional personnel.

4.1.10.2.5 Public Services

Jackson County represents a large community with police, fire, and other services. Implementation of the MOB 1 scenario would add approximately 4,917 USAF-related personnel and dependents, which represents an 18.6 percent increase of the existing county population. Although this would increase the demand for public services, because of the need for additional housing, some of the incoming personnel might reside in surrounding counties where additional public services are available. For example, Lawton, Oklahoma, in adjacent Comanche County, could be one location where incoming USAF-related personnel could relocate. Demand for public services in Jackson County has increased for several years, and this demand would continue to increase with the projected change in the population.

4.1.10.2.6 Base Services

Several base services would require additional manpower and facilities to accommodate the incoming personnel associated with the MOB 1 scenario. The base CDC is currently operating at 46 percent capacity and therefore has excess capacity. Based on the current enrollment at the CDC and expected increases for the MOB 1, there would be an estimated six new manpower requirements. No increase in dining facility requirements is needed to accommodate the incoming personnel; however, an increase of 10 food service personnel would be necessary to meet additional dining facility demand.

Based on the potential base population increase, an addition to the base fitness center would be required. As detailed in Table 2-6, the 14,400-square-foot addition to the fitness center would support the incoming personnel. In addition, construction of a 75-room Visiting Quarters would

support the new maintenance training qualification mission. The addition to the fitness center and the new Visiting Quarters might require additional manpower. The additional manpower and facility requirements that have been identified would be able to support the incoming personnel.

4.1.11 Environmental Justice and the Protection of Children

4.1.11.1 FTU Scenario Environmental Justice and the Protection of Children Consequences

Analysis of the FTU scenario noise contours relative to the baseline contours at Altus AFB indicates that off-base populations of minorities, low-income persons, and children would not be exposed to noise levels above what is occurring under the baseline conditions (see Table 4-9). Therefore, implementation of the FTU scenario at Altus AFB is not anticipated to result in disproportionate impacts on these off-base populations.

4.1.11.2 MOB 1 Scenario Environmental Justice and the Protection of Children Consequences

Analysis of the MOB 1 scenario noise contours relative to the baseline contours at Altus AFB indicates that off-base populations of minorities, low-income persons, and children would not be exposed to noise levels above what is occurring under the baseline conditions (see Table 4-9). Therefore, implementation of the MOB 1 scenario at Altus AFB is not anticipated to result in disproportionate impacts on these off-base populations.

Table 4-9. Percentage of Off-Base Populations Potentially Exposed to Noise Levels of 65 dB DNL or Greater for Altus AFB

Scenario	Percentage Minority			Percentage Low-Income			Percentage Children (Under 18)		
	65–69 dB DNL	70–74 dB DNL	75–79 dB DNL	65–69 dB DNL	70–74 dB DNL	75–79 dB DNL	65–69 dB DNL	70–74 dB DNL	75–79 dB DNL
FTU	15%	14%	15%	10%	10%	10%	30%	31%	36%
MOB 1	15%	14%	15%	10%	10%	10%	31%	32%	37%
Baseline (Existing Conditions)	15%	14%	15%	10%	10%	10%	31%	32%	37%
Region of Comparison	34%			19%			26%		

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4.2 FAIRCHILD AIR FORCE BASE (MOB 1)

This section of Chapter 4 presents the operational and environmental factors specific to Fairchild AFB. Section 2.4.2 describes the facilities and infrastructure, personnel, and flight operations requirements of the KC-46A MOB 1 scenario and the specific actions at Fairchild AFB that would be required to implement this scenario. As described in Section 4.5, the No Action Alternative would mean that the KC-46A MOB 1 scenario would not be implemented at Fairchild AFB at this time. In addition to no facility or personnel changes, there would be no change in based aircraft at Fairchild AFB and aircraft operations would continue as described for baseline conditions. The 92nd Air Refueling Wing (ARW) would continue to fly aerial refueling missions with a PAA of 30 KC-135 aircraft. In addition, the Survival, Evasion, Resistance, and Escape (SERE), Joint Personnel Recovery Agency (JPRA), and KC-135 Weapons Instructor Course (WIC) missions would continue.

4.2.1 Noise

4.2.1.1 Base Vicinity

The noise levels of the KC-46A aircraft are slightly less than the KC-135 aircraft that currently operate at Fairchild AFB. Aircraft flying at higher altitudes may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly lower noise levels than shown in Table 4-10. The difference between a KC-135 and a KC-46A during approach would be noticeable, but takeoff noise levels for the two aircraft would be more difficult to distinguish (see Table 4-10). The sound generated by helicopters has very different characteristics from fixed-wing aircraft. The SEL generated by a KC-46A would generally be less than that generated by an H-1 helicopter but slightly more than that generated by an H-60 helicopter. Helicopters rarely fly above 2,000 feet AGL. However, noise levels at higher altitudes are given for comparison with other aircraft types.

Table 4-10. Aircraft Noise Level Comparison at Fairchild AFB

Aircraft	Power Setting	Sound Exposure Level at Overflight Distance (in decibels)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
KC-46A	60% N1	96	91	85	79	70	61
KC-135	65% NF	100	95	90	84	75	67
H-1 (helicopter)	80 kts	104	100	96	91	83	75
H-60 (helicopter)	80 kts	90	86	83	79	72	66
Takeoff							
KC-46A	92% N1	107	102	96	88	78	69
KC-135	90% NF	105	100	95	90	81	73
H-1 (helicopter)	80 kts	104	100	96	91	83	75
H-60 (helicopter)	80 kts	90	86	83	79	72	66

Key: Power Units: N1 – engine speed at Location No. 1; NF – engine fan revolutions per minute; kts – knots airspeed
Source: NOISEMAP 7.2 Maximum Omega 10 Results for KC-135 and RNM for H-1 and H-60.

Aircrews operating the KC-46A aircraft would use similar flight procedures to those used by the KC-135 aircrews currently based at Fairchild AFB. Approximately 25 percent of takeoffs and 40 percent of landings would be tactical. Tactical operations are designed to reduce the risk of ground-based threats to the aircraft in forward operating locations. KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.

As part of the Air National Guard (ANG) associate unit operations, the KC-46A would be flown on some weekend days. KC-46A training flights would be conducted 312 days per year. However, mission sorties, in which the aircraft is supporting real-world operations, could take place on any day of the year. The KC-135 is currently flown 365 days per year.

Approximately 30,507 annual airfield operations are conducted at Fairchild AFB under current conditions. Under the MOB 1 scenario, KC-135 aircraft currently based at Fairchild AFB would be relocated, resulting in a decrease of 14,914 operations. Approximately 33,710 airfield operations would be conducted by KC-46A aircraft per year, resulting in 49,303 total annual airfield operations.

Noise levels near Fairchild AFB were calculated using the computer program NOISEMAP (Version 7.2), accounting for location-specific effects of terrain and ground impedance. Figure 4-3 depicts the noise contours associated with implementation of the KC-46A MOB 1 scenario at Fairchild AFB. The noise contours are displayed in 5 dB increments from 65 dB DNL to 85 dB DNL and are compared to the baseline contours. Details of the methods used to calculate noise levels and the population affected by elevated noise can be found in Volume II, Appendix B, Section B, Section B.1.3. Implementation of the KC-46A MOB 1 scenario would increase the number of off-base acres affected by noise levels equal to or greater than 65 dB DNL from 162 to 215 acres (see Table 4-11). The number of estimated off-base residents exposed to this same level of noise would increase from 15 to 17. Annoyance is a subjective response that is often triggered by interference of noise with activities. Individuals engaged in activities more easily disrupted by noise (e.g., conversation, sleeping, or watching television) are more likely to become annoyed than others. Although the reaction of an individual to noise depends on a wide variety of factors, social surveys have found a correlation between the time-averaged noise level as measured in DNL and the percentage of the affected population that is highly annoyed (see Volume II, Appendix C, Section C.1.3.1). It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed by noise, and this has been adopted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.2.7 and Volume II, Appendix C, Section C.1.3.2).

Table 4-11. KC-46A MOB 1 Scenario Noise Impacts Relative to Baseline Noise at Fairchild AFB

Noise Level (dB DNL)	Baseline Conditions			MOB 1 Scenario		
	Off-Base Population	Off-Base Acres	On-Base Acres	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	15	162	621	17	212	631
70–74	0	0	523	0	3	496
75–79	0	0	363	0	0	333
80–84	0	0	139	0	0	170
≥85	0	0	26	0	0	28
Total	**15**	**162**	**1,672**	**17**	**215**	**1,658**

Implementation of the KC-46A MOB 1 scenario at Fairchild AFB would not expose off-base areas to noise levels greater than 80 dB DNL. Two buildings on Fairchild AFB would be exposed to noise levels of 80 dB DNL or greater. Hearing loss risk among people working in high-noise environments on Fairchild AFB would continue to be assessed and managed in accordance with DoD, OSHA, and NIOSH regulations regarding occupational noise exposure.

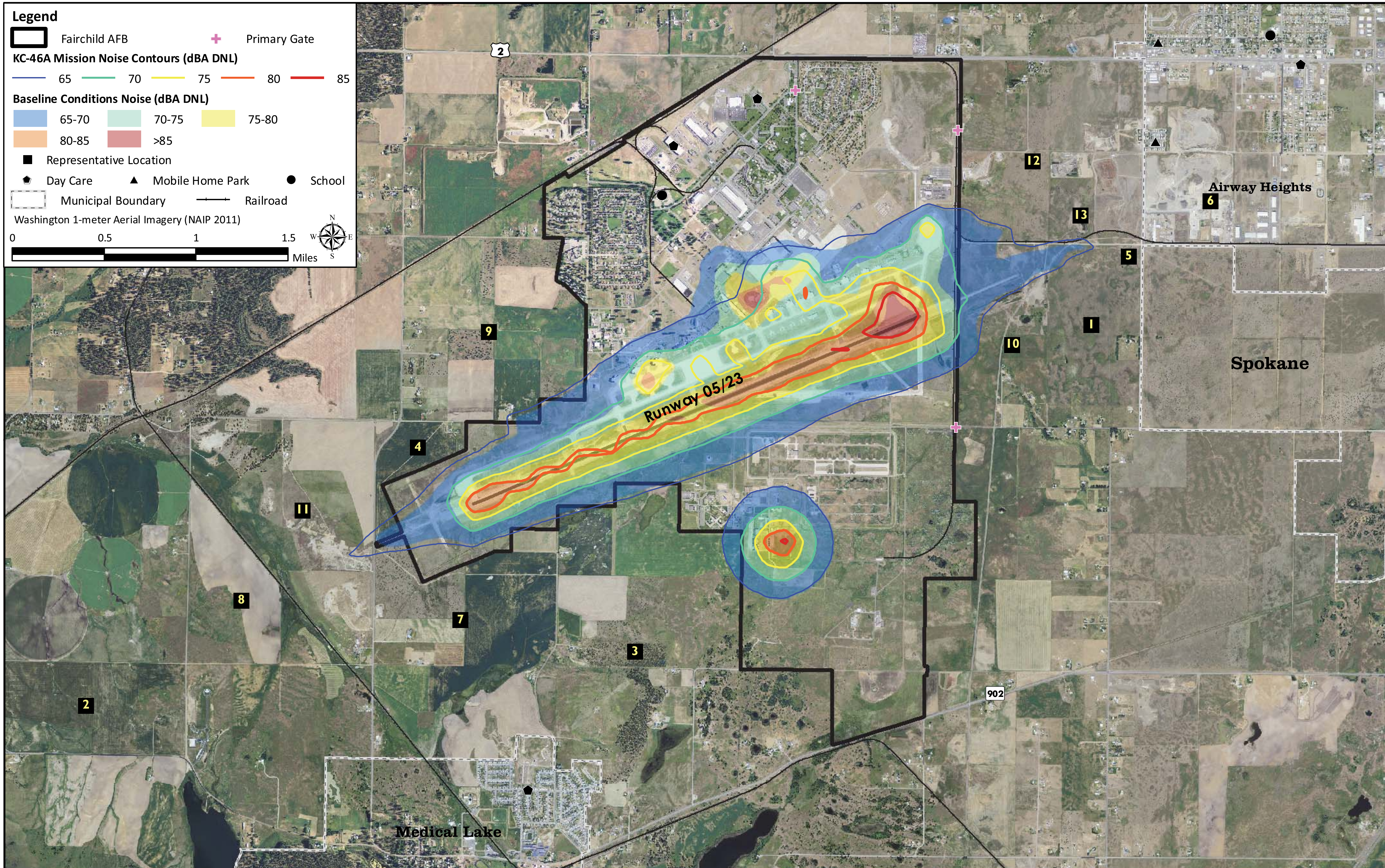

Figure 4-3. KC-46A MOB 1 Scenario and Baseline Noise Contours at Fairchild AFB

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Table 4-12 compares noise conditions at several representative locations in the area near Fairchild AFB. The representative locations, depicted on Figure 4-3, were established based on central points of U.S. Census subdivisions, and therefore do not represent specific noise-sensitive receptors.

Table 4-12. KC-46A MOB 1 Scenario Noise Levels at Representative Locations Near Fairchild AFB

Location ID	Baseline Conditions		MOB 1 Scenario	
	DNL (dB)	Top 5 SELs (dB)[a]	DNL (dB)	Top 5 SELs (dB)[a]
1	55	98–114	55	98–114
2	56	95–113	56	95–113
3	59	103–111	57	103–111
4	61	103–116	62	103–116
5	60	104–116	60	104–116
6	61	104–112	61	104–112
7	56	96–112	57	96–112
8	62	102–116	62	102–116
9	57	100–110	57	100–110
10	60	105–116	60	105–116
11	59	98–115	61	98–115
12	61	103–113	62	103–113
13	62	105–117	62	105–117

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Attachment C-1).

The DNL at 4 of the locations studied would increase by 1 dB. The DNL at Location 3 would decrease by 2 dB due to the removal of the KC-135 operations that had been the driver for increased noise in that area. The range of the top five SEL events would not change at any of the 13 locations in Table 4-12. At Fairchild AFB, departure operations from transient aircraft such as the EA-6B and F-18, and the based H-1 helicopter, make up the loudest five overflight events (dB SEL). Transient operations are not expected to change. As mentioned previously, KC-46A flying operations are slightly quieter than operation of the existing KC-135 aircraft. Increases in time-averaged noise levels near the base would be a result of increases in operations tempo instead of the addition of a louder aircraft type. A more detailed description of the loudest operations at each location can be found in Table C-1-2 in Volume II, Appendix C, Attachment C-1.

As described in Section 2.3.3, IOT&E operations would be conducted at the MOB 1 location. IOT&E operations would be expected to be indistinguishable to members of the public from standard MOB 1 flying operations and would taper off before the MOB 1 reaches full operations tempo such that annual operations listed counts for MOB 1 would not be exceeded.

C&D activities in support of the proposed beddown would be conducted in the context of an active AFB where aircraft and other types of noise are a normal part of the environment. Although equipment would be muffled, construction activities unavoidably generate localized increases in noise qualitatively different from aircraft noise. For example, a typical backhoe, dozer, and crane generate up to approximately 78, 82, and 81 dB, respectively, at a distance of 50 feet (FHWA 2006). Construction noise would be minimized in accordance with local regulations and would be temporary and intermittent, lasting only the duration of the project. Furthermore, construction activities would be expected to take place during normal

working hours (i.e., 7:00 A.M. to 5:00 P.M.). Some people living or working near the construction sites may notice and be annoyed by the noise, but noise impacts would not be substantial enough to be considered significant.

4.2.2 Air Quality

The air quality analysis estimated the magnitude of emissions that would result from implementation of the proposed KC-46A construction and operational activities at Fairchild AFB. The estimation of proposed operational emissions is based on the net change in emissions between existing KC-135 aircraft operations and the projected KC-46A operations. Volume II, Appendix D, Section D.2.1, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from proposed sources at Fairchild AFB.

The immediate area surrounding Fairchild AFB within Spokane County currently attains all of the NAAQS. Therefore, the analysis used the PSD threshold of 250 tons per year of a pollutant as an indicator of significance of projected air quality impacts for this area. The western boundaries of the Spokane maintenance areas for CO and PM_{10} extend to within 4 miles of the eastern portion of Fairchild AFB. The MOB 1 scenario at Fairchild AFB would generate commuter vehicle trips from these areas. In addition, some KC-46A flights would traverse the western portions of these areas below 3,000 feet AGL. Therefore, the analysis also estimated the amount of emissions from these proposed sources that would occur within these areas. The analysis used the applicable conformity thresholds for these areas as indicators of significance (100 tons per year of CO and PM_{10}).

Construction – The KC-46A beddown at Fairchild AFB would require construction and/or renovation of airfield facilities, including training facilities, hangars, taxiways, and maintenance and fueling facilities. Air quality impacts due to proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions ($PM_{10}/PM_{2.5}$) due to the operation of equipment on exposed soil. Construction activity data were developed to estimate proposed construction equipment usages and associated combustive and fugitive dust emissions for each project alternative.

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollutant Emission Factors*, AP-42, Volume I (USEPA 1995); the USEPA NONROAD2008a model for nonroad construction equipment (USEPA 2009a); and the USEPA MOVES2010b model for on-road vehicles (USEPA 2013b).

Inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Section 4.1.2 identifies the standard construction practices that would control fugitive dust.

Table 4-13 presents estimates of emissions from construction activities that would result from the KC-46A operations proposed for Fairchild AFB. These data show that, for each year of construction, total emissions would fall well below the PSD thresholds used to indicate significance or insignificance. Therefore, temporary construction emissions associated with the KC-46A beddown would produce less than significant air quality impacts. The main sources of $PM_{10}/PM_{2.5}$ emissions would be fugitive dust from the operation of equipment on unpaved surfaces.

Table 4-13. Annual Construction Emissions Under the MOB 1 Scenario at Fairchild AFB

Year	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
CY 2014	2.48	13.86	26.61	0.73	11.80	11.25	3,621
CY 2015	0.83	4.67	8.75	0.25	4.09	1.10	1,256
CY 2016	0.03	0.48	0.28	0.01	0.65	0.09	55
CY 2017	0.12	4.00	0.63	0.02	4.90	0.07	144
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

Operations – Sources associated with operation of the proposed KC-46A MOB 1 scenario at Fairchild AFB and existing KC-135 operations replaced by the KC-46A MOB 1 scenario would include (1) operations and engine maintenance/testing of aircraft, (2) onsite POVs and GMVs, (3) offsite POV commutes, (4) AGE, (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and other sources. Operational data used to calculate projected KC-46A aircraft emissions were obtained from data used in the project noise analyses (see Section 4.2.1). Factors used to calculate combustive emissions for the KC-46A aircraft were based on emissions data developed by Pratt and Whitney for the PW4062 engine (ICAO 2013b). The operational times in mode for the KC-46A engine were based on those currently used for the KC-135 aircraft (Air Force Civil Engineer Center 2013).

Emissions from most non-aircraft sources generated by the proposed KC-46A operations were estimated by multiplying existing emissions for these sources at Fairchild AFB by the ratio of total employment populations associated with the KC-46A beddown and baseline conditions at Fairchild AFB. The air quality analysis used CY 2012 to define existing emissions, as it included the most recent calendar year of operational activities at Fairchild AFB (see Table 3-14). However, emissions from the usage of AGE by the KC-46A were based on AGE usages for existing KC-135 aircraft at Fairchild AFB. In addition, VOC emissions from mobile fuel transfer operations were estimated by considering the net change in landing and takeoff cycles between the proposed KC-46A aircraft and existing KC-135 mission at Fairchild AFB.

The analysis of proposed aircraft operations is limited to operations that occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

The analysis of air quality impacts due to implementation of the KC-46A MOB 1 scenario at Fairchild AFB is based on the net change in emissions that would occur from the replacement of existing KC-135 mission with operations from the beddown of 36 KC-46A aircraft. To produce a conservative analysis, it was assumed that all 36 KC-46A aircraft would become operational at Fairchild AFB in CY 2016.

Table 4-14 summarizes the annual operational emissions within Spokane County that would result from implementation of the KC-46A MOB 1 scenario at Fairchild AFB. The data in Table 4-14 show that the net increase in emissions from the replacement of existing KC-135 aircraft operations with operations from 36 KC-46A aircraft would not exceed 250 tons per year for VOCs, CO, SO_x, PM_{10}, or $PM_{2.5}$. Therefore, implementing the KC-46A MOB 1 scenario at Fairchild AFB would produce less than significant impacts on these pollutant levels. However, these data also show that the increase in NO_x emissions would exceed 250 tons per year. The results of comparison of projected emissions from the action in the Spokane CO and PM_{10}

maintenance areas are discussed below. KC-46A aircraft operations and on-wing engine testing activities are the primary contributors to these emission increases.

Table 4-14. Annual Operations Emissions within Spokane County Under the MOB 1 Scenario at Fairchild AFB, CY 2016

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-46A Aircraft Operations	50.07	201.74	837.57	45.42	2.92	2.49	125,648
On-Wing Aircraft Engine Testing – KC-46A	14.39	49.54	28.94	2.34	0.21	0.19	6,286
Aerospace Ground Support Equipment – KC-46A	0.59	4.22	4.80	0.18	0.71	0.65	858
UH-60 Aircraft Operations	0.91	8.00	2.21	0.20	1.50	1.50	1,793
UH-1N Aircraft Operations	0.14	0.68	0.26	0.02	0.24	0.24	169
AGE – Existing Aircraft	3.95	14.49	9.00	0.90	2.20	2.20	1,515
Transient Aircraft	0.56	4.03	4.58	0.18	0.67	0.62	819
On-Wing Aircraft Engine Testing – UH-1M	0.11	0.52	0.06	0.01	0.08	0.08	55
On-Wing Aircraft Engine Testing – UH-60	0.02	0.52	0.16	0.01	0.14	0.14	96
Government-Owned Vehicles	0.03	0.64	0.69	0.00	0.04	0.03	207
Privately Owned Vehicles – On Base	0.04	3.14	0.53	0.01	0.05	0.03	521
Privately Owned Vehicles – Off Base	1.27	82.69	12.52	0.22	1.58	0.84	13,366
Mobile Fuel Transfer Operations	0.36	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	14.49	11.48	14.05	0.09	1.05	1.05	14,748
Total Fairchild AFB Emissions – MOB 1 Scenario	**86.86**	**381.69**	**915.36**	**49.58**	**11.36**	**10.04**	**166,078**
Existing Fairchild AFB Emissions	**41.96**	**286.84**	**305.27**	**24.22**	**10.65**	**9.77**	**95,699**
Fairchild AFB MOB 1 Scenario Minus Existing Emissions[b]	**44.90**	**94.84/ (6.69)**	**610.10**	**25.36**	**0.72/ (0.03)**	**0.27**	**70,379**
MOB 1 Scenario Net Emissions Increase Fraction of Existing Conditions	**1.07**	**0.33**	**2.00**	**1.05**	**0.07**	**0.03**	**0.74**
MOB 1 Scenario Net Emissions Increase Fraction of Spokane County Emissions	**0.001**	**0.001**	**0.04**	**0.08**	**0.00001**	**0.0001**	**0.03**
PSD/Conformity Threshold	**250**	**250/100**	**250**	**250**	**250/100**	**250**	**N/A**

[a] Source does not emit particular pollutant.

[b] The second set of CO and PM_{10} emissions presented are those that only would occur within the Spokane CO and PM_{10} maintenance areas.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

Emissions of NO_x resulting from implementation of the KC-46A MOB 1 scenario within Spokane County were compared to the most recent Spokane County emissions inventory (CY 2008) to determine the relative magnitude of these emissions and their potential to combine with baseline emissions and contribute to an exceedance of an ambient air quality standard. The NO_x emission

increases resulting from the proposed KC-46A operations would amount to about 4 percent of the total NO_x emissions generated by Spokane County in 2008 (see Table 3-13). The majority of proposed NO_x emissions result from KC-46A aircraft operations up to an altitude of 3,000 feet AGL and across several square miles that comprise the Fairchild AFB airspace and adjoining aircraft flight patterns. These emissions would be adequately dispersed through this volume of atmosphere to the point that they would not result in substantial ground-level impacts in a localized area. Given that the county attains the nitrogen dioxide (NO_2) NAAQS by a wide margin, these NO_x emission increases would likely not be substantial enough to contribute to an exceedance of the NO_2 NAAQS.

Maximum O_3 levels in the Spokane region are near the national 8-hour O_3 standard. For example, the Cheney air monitoring station, located approximately 10 miles southeast of Fairchild AFB, recorded an O_3 concentration that was about 93 percent of the value of the NAAQS in 2012 (SRCAA 2013b). As mentioned above, emissions from the proposed KC-46A aircraft operations would be diluted over a large volume of atmosphere across the Fairchild AFB project region. These factors would dilute the impact of NO_x (and VOC) emissions from the proposed action within a localized area and to ambient O_3 levels. As a result, the increase in emissions may not be substantial enough to contribute to an exceedance of the O_3 NAAQS. Nonetheless, the NO_x emissions projected to result from implementation of the KC-46A MOB 1 scenario represent a 4 percent annual increase and the potential for a 2 ton per day, or more, increase in NO_x emissions in the ROI which, when taken together with the slight annual/daily increase in VOCs from the action in combination with all other sources of both precursor emissions in the region, could be substantial enough to contribute to an exceedance of the O_3 NAAQS.

The air quality analysis evaluated the net change in emissions that would occur within the Spokane CO and PM_{10} maintenance areas due to the MOB 1 scenario versus existing operations at Fairchild AFB. This analysis relied on the following assumptions: (1) within the CO maintenance area, the average commuter trip would traverse 4.0 miles of the area and the amount of KC-46A/KC-135 closed patterns that would occur below 3,000 feet AGL within the area was 4 percent and (2) within the PM_{10} maintenance area, the average commuter trip would traverse 4.7 miles of the area and the amount of KC-46A/KC-135 closed patterns that would occur below 3,000 feet AGL within the area was 5 percent. The results of the analysis determined that proposed MOB 1 operations within these areas would produce slightly lower CO and PM_{10} emissions compared to those generated by existing operations at Fairchild AFB. This is the case, as lower CO and PM_{10} emission standards for commuter vehicles in the future (CY 2016 vs. CY 2012) would outweigh the slight increase in KC-46A aircraft CO and PM_{10} emissions generated by MOB 1 operations within the CO and PM_{10} maintenance areas. As a result, these net changes in emissions generated within the Spokane CO and PM_{10} maintenance areas would not exceed the applicable conformity thresholds of 100 tons per year for CO or PM_{10}. Therefore, the MOB 1 scenario at Fairchild AFB would produce less than significant CO and PM_{10} impacts within these areas.

Proposed operations under the MOB 1 scenario at Fairchild AFB would emit HAPs that could potentially impact public health. Proposed KC-46A aircraft operations and on-wing engine testing activities would generate the majority of HAPs from this scenario. As discussed above for proposed criteria pollutant impacts, since proposed KC-46A operations would occur intermittently over a volume of atmosphere, they would produce minimal ambient impacts of HAPs in a localized area.

Early in its planning, the USAF reconsidered its operational assumptions and projections to avoid or reduce potential impacts to the extent feasible. This resulted in the development of

alternatives that reduced the emissions of criteria pollutants to the extent feasible by reducing the number of near-field operations, such as landing and take-off operations. At this time, the USAF is not aware of any other feasible mitigations that could be applied to further reduce the emissions impact from KC-46A aircraft operations and on-wing engine testing activities.

In addition to presenting estimates of GHG emissions that would result from KC-46A operations at Fairchild AFB, the following considers how climate change may impact the KC-46A beddown at Fairchild AFB. For Fairchild AFB, the projected climate change impact of concern is increased temperatures, as documented in *Global Climate Change Impacts in the United States* (USGCRP 2009). This report predicts that the region surrounding Fairchild AFB will experience (1) increased droughts and wildfires and (2) reduced springtime snow packs, summer stream flows, and water supplies. While operations at Fairchild AFB have already adapted to droughts and scarce water supplies, exacerbation of these conditions in the future may increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts.

4.2.3 Safety

This section addresses the potential environmental consequences to flight and ground safety that could occur at or in the vicinity of Fairchild AFB with implementation of the KC-46A MOB 1 scenario.

4.2.3.1 Flight Safety

Aircraft Mishaps – The KC-46A MOB 1 scenario at Fairchild AFB would replace the existing KC-135 mission. As described in Section 4.1.3, Safety, for Altus AFB, the KC-46A is a commercial variant of the existing Boeing 767 aircraft with a proven safety record.

As discussed previously, the accident rate for the KC-46A is expected to be similar to that of the commercial airframe upon which it is based. Using the accident rate of 0.36 per flight cycle, it is projected that the probability of a KC-46A accident in the vicinity of the airfield would be low (less than one every 100 years; see Volume II, Appendix B, Section B.3.3.1).

Therefore, implementation of the KC-46A MOB 1 scenario at Fairchild AFB is not anticipated to result in any net increase in the safety risks associated with aircraft mishaps or any increase in the risks of occurrence of those mishaps even with the additional aircraft and increased flight operations.

Bird/Wildlife-Aircraft Strike Hazard – Replacement of the 30 KC-135 aircraft with 36 KC-46A aircraft is not anticipated to increase the risk of aircraft accidents due to bird/wildlife strikes. Ongoing elements of the Fairchild AFB BASH Plan would continue.

Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology as a tool for analysis and correlation of bird habitat, migration, and breeding characteristics with key environmental and manmade geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings, which take place prior to any sortie.

With proposed KC-46A flight operations similar to those being conducted by KC-135 aircraft at Fairchild AFB, the overall potential for bird/wildlife-aircraft strikes is not anticipated to be significantly greater than current levels. All safety actions in place for existing KC-135 operations

would continue to be in place for the KC-46A aircraft. Fairchild AFB personnel have developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and have documented detailed procedures to monitor and react to heightened risk of bird strikes. When bird/wildlife-aircraft strike hazard risks increase, limits are placed on low-altitude flight and some types of training (e.g., multiple approaches, closed-pattern pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the potential for bird strikes is high within the airspace. KC-46A pilots would be subject to these procedures. Therefore, no significant impact would occur related to bird/wildlife-aircraft strike hazard issues.

4.2.3.2 Ground Safety

There are no aspects of the KC-46A MOB 1 scenario at Fairchild AFB that are expected to create new or unique ground safety issues not already addressed by current policies and procedures. Operations and maintenance procedures, as they relate to ground safety, are conducted by base personnel and would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulations, technical orders, and AFOSH standards.

No unique construction practices or materials would be required as part of any of the renovation, addition, or construction projects associated with the KC-46A MOB 1 scenario. All renovation and construction activities would comply with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements. The USAF does not anticipate any significant safety impacts as a result of construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented.

The KC-46A would be operated in an airfield environment similar to the current operational environment. Since the KC-46A is a new airframe and would require response actions specific to the aircraft, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the KC-46A and associated equipment. With this update, the Fairchild AFB airfield safety conditions would be similar to baseline conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

As indicated in Section 3.2.7, there is incompatible development within the northern APZ II. Portions of the CZs on both ends of the runway currently extend outside the base boundary. See Volume II, Appendix B, Figure B-1, for the typical generic CZ and APZ dimensions. However, Fairchild AFB does have easements that grant the base control over the development of that land. Fairchild AFB would continue working with developers to highlight the Air Installation Compatible Use Zone (AICUZ) guidelines.

4.2.4 Soils and Water

All of the C&D activities associated with implementing the proposed KC-46A MOB 1 scenario would occur within the Fairchild AFB boundary. The proposed disturbed area for the projects associated with the KC-46A MOB 1 scenario would not exceed 40 acres (the area for new construction and additions/alterations). The majority of construction, renovation, and demolition activities associated with the KC-46A MOB 1 scenario would occur in Drainage Basin 1; the renovation of Building 1037 would occur in Drainage Basin 5.

The majority of the proposed construction, renovation, and demolition activities would occur in areas already developed and/or previously disturbed by excavation in the northern portion of the

main base. The proposed new apron and fuels upgrade project along the flightline would add approximately 14 acres of impervious surface in Basin 1. Representing only a 2 percent increase in this basin, this development is not anticipated to result in adverse impacts on soil or water resources. Although these areas have predominantly been disturbed in the past, new construction activities would have the potential to disturb underlying soils. The soil map units in the areas of the proposed action are the Phoebe-Bong complex and the Cheney-Uhlig complex. Construction limitations for the Phoebe-Bong complex include instability of excavated walls, potential slope failure, moderate corrosion of concrete, and high wind erosion potential. Construction limitations for the Cheney-Uhlig complex include unstable excavation walls and moderate wind erosion potential.

For any projects that result in soil disturbance, the USAF would ensure that all construction activities are conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. The USAF would specify compliance with the stormwater discharge permit in the contractor construction requirements.

The Fairchild AFB SWPPP for industrial facilities identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. The base is also required to obtain permit coverage for all construction activities over 1 acre under USEPA's 2008 NPDES General Permit for Stormwater Discharges from Construction Activities to ensure that sedimentation does not impact water quality. No construction activities would begin until a project-specific SWPPP is completed.

No sensitive groundwater resources, surface water resources, or floodplains are known to occur in areas planned for any of the KC-46A development projects.

4.2.5 Biological Resources

4.2.5.1 Vegetation

The beddown of the proposed MOB 1 scenario at Fairchild AFB would have similar potential impacts on vegetation as described for the MOB 1 scenario at Altus AFB. All of the projects would occur in currently developed or disturbed areas that provide little wildlife habitat value and are not anticipated to result in significant impacts on vegetation.

4.2.5.2 Wildlife

Beddown requirements and potential impacts on wildlife would be similar to those described previously for the MOB 1 scenario at Altus AFB. Although birds, small mammals, invertebrates, and various other small wildlife species may utilize the maintained areas affected by the proposed action, these areas do not function as principal wildlife habitat. Infrastructure projects are not proposed to occur in the south base area, where wetlands and higher-value wildlife habitat occurs. The effects of noise produced by construction, renovation, and demolition activities would be similar to those described for Altus AFB, having a negligible impact on wildlife populations.

Airfield operations would increase at Fairchild AFB, resulting in increased noise on and near the base. However, the KC-46A is quieter than the existing aircraft and the KC-135 currently operating at Fairchild AFB. Potential effects on wildlife would be similar to those described for the MOB 1 scenario at Altus AFB, including short-term noise-related stress and behavioral responses. However, DNL noise contours would increase marginally on and near the base and

would not substantially increase the amount of land exposed to increased noise levels. Noise contours are not anticipated to appreciably change in the south base area as a result of the KC-46A flight operations.

Increased operations would increase the potential for aircraft to strike birds and other wildlife in the air and on the runway. However, continued adherence to the base's BASH Plan (USAF 2010a) would minimize the risk of collisions. To prevent aircraft strikes of red-tailed hawks specifically, Fairchild AFB participates in an extraction program with the U.S. Department of Agriculture's Animal and Plant Health Inspection Service.

Overall impacts on wildlife would be similar to those described for the MOB 1 scenario at Altus AFB. Significant wildlife impacts are not anticipated to result from implementation of the KC-46A MOB 1 scenario at Fairchild AFB.

4.2.5.3 Special-Status Species

No federally threatened or endangered species are known to occur at Fairchild AFB in the ROI for the KC-46A beddown. On rare occasions bald eagles have been observed migrating through the base. No known bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) nests have been reported on base (Fairchild AFB 2012a). No significant impacts on bald and golden eagle populations are anticipated due to flying operations associated with the proposed action.

There are no other federally or state-listed bird species and/or designated critical habitat. There would be no significant impacts on special-status species resulting from implementation of the MOB 1 scenario at Fairchild AFB.

During the 2012 herptile survey, Columbia spotted frogs (*Rana luteiventris*) were the most commonly detected species at Fairchild AFB. Populations were found utilizing different habitats in the southern portion of Fairchild AFB. The largest numbers of spotted frogs were detected in free-flowing ditches. Both adults and larvae were detected in very large numbers in the ditch paralleling the flightline. Primarily due to the conservation concern of isolated populations in the southern part of its range, the Columbia spotted frog is considered a Washington state-listed candidate species (USFWS 2013d). Because the proposed facilities and infrastructure updates would not occur within the southern portion of the base, implementation of the MOB 1 scenario at Fairchild AFB is not likely to adversely affect the Columbia spotted frog.

The southern portion of Fairchild AFB contains vernal pools and swale that support Spalding's catchfly (*Silene spaldingii*) (federally and state-listed threatened species), American pillwort (*Pilularia americana*) (state-listed threatened species), inch-high rush (*Juncus uncialis*) (state-listed sensitive species), mousetail (*Myosurus laevicaulis*) (state-listed sensitive species), and Northwestern yellowflax (*Sclerolinon digynum*) (state-listed threatened species) (Fairchild AFB 2011e).

Current protection measures for Spalding's catchfly on Fairchild AFB include (1) protect existing populations and habitat and (2) maintain occupied and potential habitat in a suitable condition (Fairchild AFB 2011e). Because these special-status plant species do not occur within the facilities and infrastructure project areas, there would be no significant impacts on Spalding's catchfly, American pillwort, inch-high rush, mousetail, or Northwestern yellowflax resulting from implementation of the MOB 1 scenario at Fairchild AFB.

There are no other federally or state-listed plant species and/or designated critical habitat on Fairchild AFB. There would be no significant impacts on special-status species resulting from implementation of the MOB 1 scenario at Fairchild AFB.

4.2.5.4 Wetlands

There are no known wetlands in any of the areas proposed for development and implementation of the KC-46A MOB 1 scenario at Fairchild AFB. Therefore, implementation of the MOB 1 scenario is not anticipated to directly or indirectly impact wetlands.

4.2.6 Cultural Resources

At Fairchild AFB, implementation of the KC-46A MOB 1 scenario is proposed to include the demolition of 9 buildings; renovation of 11 buildings; additions/alterations to 2 buildings, including trainers; and modifications to roads, parking, and taxiways. The Washington SHPO (Department of Archaeology and Historic Preservation [DAHP]) has concurred that Building 2050, constructed in 1943, is eligible for the NRHP (see Volume II, Appendix A, Section A.5.2). Renovations to this building, proposed under the KC-46A MOB 1 scenario, would have an adverse effect on the historic integrity of the property. The DAHP has concurred with this determination of effect and is still considering the effect of the proposed action on Building 2245 (see Volume II, Appendix A, Section A.5.2). Fairchild AFB and the DAHP have amended their existing Memorandum of Agreement (MOA) regarding demolition of historic structures. The MOA amendment includes provisions to reinitiate consultation regarding mitigation for Building 2050 and 2245 should Fairchild AFB be selected for the MOB 1 mission (see Volume II, Appendix A, Section A.5.2.2).

Demolition proposed to occur along the flightline would remove five buildings in the Historic Flight Line District: 1011, 1013, 1015, 1017, and 1019. Three additional buildings in the Historic Flight Line District are proposed for renovation: 1001, 1003, and 1025. One additional building (2120) proposed for demolition is located outside the flightline area. Impacts to all of these buildings were previously mitigated through stipulations agreed to in the signed MOA (92 ARW 2012). Some aspects of the mitigations agreed to in the MOA must be completed prior to demolition and building modifications; others must be completed within 5 years of the signing date (92 ARW 2012).

No impacts on archaeological historic properties are anticipated to result from implementation of the KC-46A MOB 1 scenario at Fairchild AFB. The base has been inventoried for archaeological resources, and no archaeological resources have been identified within the area of potential effect. Because ground-disturbing activities would occur in previously disturbed contexts, it is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. It is still possible that archaeological resources could be buried on Fairchild AFB, although the potential is considered low (Fairchild AFB 2012b). In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA, as specified in standard operating procedures described in the ICRMP (Fairchild AFB 2012b).

Indirect impacts on cultural resources from population increase or visual intrusions are extremely unlikely. With implementation of the MOB 1 scenario, the population would increase by a small amount relative to the existing population at the base and in the Spokane metropolitan area. New construction would occur in the context of an active Air Force Base, where changes in the infrastructure are common. Visual effects on the historic district would be mitigated by adherence to the MOA. The viewshed of remaining historic properties would not be affected by the proposed construction.

No adverse Section 106 impacts to tribal resources are anticipated. The USAF initiated consultation with four tribes. Responses were received from two tribes indicating no objections

to the USAF's finding of no adverse impact. One of those two tribes requested additional consultation should Fairchild AFB be selected for the MOB 1 mission. Additional efforts were made to contact the remaining two non-responsive tribes without success (see Table A-1 in Volume II, Appendix A, Section A.3). While the USAF values its relationship with all tribes and will continue to consult on other planning efforts or matters of known or potential interest to tribes, Section 106 consultation on the KC-46A MOB 1 beddown proposed alternative at Fairchild AFB is now complete.

4.2.7 Land Use

4.2.7.1 Physical Development

The physical development proposed to support the KC-46A MOB 1 scenario at Fairchild AFB would occur along the flightline and adjacent locations where existing industrial-type, administrative, and mission support activities are located. None of the physical development associated with implementation of the KC-46A MOB 1 scenario at Fairchild AFB is anticipated to result in impacts to land use. Subsequent operations and maintenance activities for the proposed KC-46A MOB 1 scenario would conform to current and future land uses on the base.

Impacts from the proposed KC-46A MOB 1 scenario on areas and communities located outside of Fairchild AFB are also anticipated to be negligible and similar to those described in Section 4.1.7.1.1. Implementation of the KC-46A MOB 1 scenario would potentially require approximately 417 housing units, either from the current supply of vacant housing in the area or as new construction. New development would be required to conform to the existing Airport Overlay Zone (AOZ) surrounding Fairchild AFB current zoning and jurisdictional approvals. Base review of new residential development near Fairchild AFB is recommended given the concern about the proposed West Plains Mixed Use Development area and the ongoing process to amend the AOZ (following the 2009 JLUS) as an interim measure. These reviews would protect the base from encroachment and new incompatible development, and would ensure that new housing, which could provide a supply for military families, is planned in accordance with current land uses.

4.2.7.2 Aircraft Operations

With 36 new KC-46A aircraft replacing the existing 30 KC-135 aircraft, KC-46A aircrews are anticipated to fly 33,710 airfield operations versus the 14,914 airfield operations currently flown by KC-135 aircraft. This proposed increase in operations slightly expands the area exposed to noise equal to or greater than 65 dB DNL by about 39 acres (from approximately 1,834 to 1,873 acres) (see Figure 4-3). The expansion of this projected noise envelope on Fairchild AFB would primarily affect the airfield, the training complex, and aircraft maintenance and industrial areas along the airfield that currently experience high levels of noise.

Outside the base boundary, approximately 53 additional acres of land are expected to be exposed to noise levels equal to or greater than 65 dB DNL. This land primarily supports mining and industrial uses and is mostly vacant and undeveloped. These land uses are compatible with the projected noise levels. Northeast of the runway, land within Spokane County is zoned for mineral uses and light industrial use. A small area of industrial land in the southwest part of the City of Airway Heights would also be affected by this level of noise, but industrial uses are also compatible. No residential areas to the northeast are expected to be exposed to this level of noise.

To the southwest, areas exposed to noise equal to or greater than 65 dB DNL would expand slightly and extend past the railroad line west of the base. Noise exposure would increase to

incompatible levels just above 65 dB DNL over a couple of homes along West Thorpe Road. There are no other homes in this area that are projected to be affected by incompatible noise levels. Local residents, particularly in Medical Lake and Airway Heights, could notice an increase in noise and aircraft activity due to the increased number of operations at the airfield, but projected noise levels would remain below 65 dB DNL. Overall, no significant impacts on land use at Fairchild AFB are anticipated to result from aircraft operations associated with implementation of the KC-46A MOB 1 scenario. Although few impacts are projected, newly approved development near the base suggests that allowable densities may not provide for long-term compatible uses in surrounding areas (USAF 2013c).

4.2.8 Infrastructure

Refer to Section 3.2.8 for a description of existing infrastructure system capacities and conditions at Fairchild AFB. Table 2-10 provides changes in population due to implementation of the MOB 1 scenario at Fairchild AFB. These changes in population and proposed development were used to determine the impact on infrastructure. The maximum demand or impact on capacity was calculated for the potable water, wastewater, electric, and natural gas systems based on the change in population. To identify maximum demand or impact on these systems, any change in population was assumed to live on base. For the assessment of the transportation infrastructure, any change in population was assumed to reside off base.

4.2.8.1 Potable Water System

With an average per capita household water use estimation of about 125 GPD (UFC 3-230-03), it is anticipated that the change in population would result in an increase of approximately 0.15 MGD. Implementation of the MOB 1 scenario would increase average daily demand from 16 to 18 percent of the base potable water system capacity and peak demand from 44 to 46 percent.

4.2.8.2 Wastewater

The USEPA estimates that the average person generates approximately 100 GPD of wastewater between showering, toilet use, and general water use (USEPA 2005). Using this amount as a planning factor along with the change in population, implementation of the MOB 1 scenario would increase wastewater discharge from Fairchild AFB by 0.12 MGD. This would increase the average daily discharge from the base from 39 to 45 percent of base system capacity and peak discharge from 70 to 77 percent. As noted in Section 3.2.8.2, a series of projects to upgrade the system is underway and will reduce historical levels of inflow and infiltration (I&I) by 80 percent.

4.2.8.3 Stormwater System

The MOB 1 scenario would require demolition of facilities and construction of new facilities. This would take place within the existing developed base flightline and cantonment areas. Table 2-9 identifies projects associated with the MOB 1 scenario; the total disturbed area associated with these projects would not exceed 40 acres (the area for new construction and additions/alterations). The majority of construction, renovation, and demolition activities associated with the KC-46A MOB 1 scenario would occur in Drainage Basin 1; the renovation of Building 1037 would occur in Drainage Basin 5. The proposed new apron and fuels upgrade project would add less than 14 acres of additional impervious surface, for a total of 714.4 acres of impervious surface for Basin 1. This represents a 2 percent increase of impervious surface. Basin 1 drains into two small ponds, which

attenuate the stormwater flow from Basin 1 prior to discharge off base. The capacity of these ponds may need to be increased to handle the additional run-off, as well as to control discharges off base over a longer period of time (USAF 1999).

During the short-term construction period for the MOB 1 scenario, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales, and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures.

An SWPPP update would be required, and the requirements of the EISA would be followed to maintain or restore, to the maximum extent practical, the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow.

4.2.8.4 Electrical System

To estimate the change in residential electrical use associated with personnel and their dependents, data from the USEIA were used to identify that residential consumers averaged about 12.82 MWH per person per year (2,837,631 users) in Washington in 2011 (the best available statistics), with a total of about 36,376,143 MWH consumed (USEIA 2011). Using that amount as a planning factor along with the change in population, implementation of the MOB 1 scenario would increase the state annual residential demand for electricity by 14,755 MWH per year. This represents less than 1 percent of total usage in 2011. Assuming the change in population resides on Fairchild AFB and the population uses electricity at the 2011 residential average rate of 0.35 MWH per person per day, implementation of the MOB 1 scenario would increase the average daily use of electricity by 40.42 MWH per day. The MOB 1 scenario would increase average daily demand by 19 percent of current demand. The north and south substations have the capability to provide redundant power for the entire base, with the exception of limited “load shedding” of non-critical mission requirements during peak loading periods when the north substation is supplying all base loads (the south substation is out of service). There are projects programmed to increase the size of the north substation and increase electrical conductor sizes at critical points to eliminate load shedding for redundant capability.

4.2.8.5 Natural Gas System

For residential natural gas consumption estimations, data from the USEIA were used to identify that approximately 1,079,277 residential consumers in Washington used about 85,393 MMcf of natural gas in 2011 (USEIA 2011). This equates to an average of about 0.08 MMcf per person per year. Using that amount as a planning factor along with the change in population, implementation of the MOB 1 scenario would increase state annual residential demand for natural gas by 92 MMcf. This represents less than 1 percent of the total state-wide usage in 2011.

4.2.8.6 Solid Waste Management

All solid waste is collected and transported off site for disposal. Off-base contractors completing any C&D projects at Fairchild AFB would be responsible for disposing of waste generated by these activities. Using methodology developed by the USEPA (USEPA 2009b), it is estimated that implementation of the MOB 1 scenario would result in approximately 22,937 tons of C&D debris.

Disposal of the debris would be through an integrated C&D debris diversion approach or removal to landfills. The integrated C&D debris diversion approach includes reuse, recycling, volume reduction/energy recovery, and similar diversion actions. Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. Much of this material can be recycled, reused, or otherwise diverted from landfills. C&D waste, including waste contaminated with hazardous waste, ACM, LBP, or other undesirable components, would be managed in accordance with AFI 32-7042, "Waste Management." The DoD has set a target C&D debris diversion rate of 60 percent by fiscal year 2015 (DoD 2012). Applying this diversion target rate to the potential amount of C&D debris would result in approximately 13,763 tons of C&D debris being diverted for reuse or recycling and approximately 9,175 tons being placed in landfills. This would potentially be a short-term, minor, adverse impact that the landfill could absorb, as the Graham Road Recycling and Disposal landfill accepts an average of 122,000 tons of waste annually, including C&D waste. The overall remaining capacity of the landfill is 13 million tons with a projected life remaining of 103 years (Waste Management 2013).

Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, LBP, or other hazardous components, would be managed in accordance with AFI 32-7042, "Waste Management."

4.2.8.7 Transportation

Implementation of any of the facilities and infrastructure projects planned for the proposed KC-46A MOB 1 scenario at Fairchild AFB would require the delivery of materials to, and removal of, construction-related debris from demolition, renovation, and new construction sites. Trucks associated with these activities would access the base via the Rambo Gate, which is used for commercial vehicles. Construction crews would access the base via the Main Gate or the Rambo Gate. Construction-related traffic would comprise a small portion of the total existing traffic volume in the area and at the base. Increased traffic associated with these activities could contribute to increased congestion at the entry gates, delays in the processing of access passes, and degradation of the affected road surfaces.

Additionally, intermittent traffic delays and temporary road closures could result in the immediate vicinity of the facility and infrastructure project sites. Potential congestion impacts could be avoided or minimized by scheduling truck deliveries outside of the peak inbound traffic time and by having construction workers use the Rambo Gate instead of the Main Gate. Also, many of the heavy construction vehicles would be driven to the site and kept on base for the duration of the C&D activities, resulting in relatively few additional trips. Traffic delays would be temporary in nature, ending once construction activities have ceased. As a result, no long-term impacts to on- or off-base transportation systems are anticipated.

Implementation of the MOB 1 scenario would result in a minor increase of 438 on-base mission personnel (full-time military, DoD civilians, other base personnel), an increase of approximately 7.5 percent in daily commuting traffic to and from the base. In addition to the increase in personnel, there would also be a small increase in dependent and commercial traffic. This assumes that all personnel and dependents live off base, work standard workdays, and drive individually to the base. This increase in base mission personnel could increase congestion and queuing at the Main Gate and the Thorpe/Rambo Gate during morning and evening rush hours. To minimize the potential for adverse impacts, the base could adjust the schedule of operations to accommodate this increase, upgrade the entry gates (e.g., provide additional lanes), and/or

provide additional personnel at the gates to process security checks during the peak hours. Regional access roads and the on-base road network have adequate capacity to absorb the small amount of additional traffic without major impacts on traffic flow, circulation, or level of service.

4.2.9 Hazardous Materials and Waste

4.2.9.1 Hazardous Materials Management

Section 4.1.9.5 describes the hazardous materials management specific to the KC-46A aircraft. No new hazardous materials would be added that exceed Fairchild AFB's current hazardous waste processes. Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through HAZMARTs are adequate to handle the changes anticipated with the replacement of the KC-135 mission (30 aircraft) with the KC-46A MOB 1 mission (36 aircraft), but would be expanded to meet the increased use.

4.2.9.1.1 Aboveground and Underground Storage Tanks

The replacement of 30 KC-135 aircraft with 36 KC-46A aircraft at Fairchild AFB has the potential to increase the maximum daily consumption of JP-8. The increase in fuel consumption would be supported by the current infrastructure at the base. Some of the new and remodeled facilities would require the addition of new ASTs, USTs, and hazardous materials and hazardous waste containers. The new and remodeled facilities would be constructed with berms and drains leading to OWSs, if required, to contain releases of petroleum products.

4.2.9.1.2 Toxic Substances

Several demolition, renovation, and addition/alteration projects are planned as part of the proposed KC-46A MOB 1 scenario. Any renovation, construction, or demolition project proposed at Fairchild AFB would be reviewed to determine if ACM is present. Volume II, Appendix E, Table E-3, contains a list of buildings proposed for modification and their potential to contain ACMs. If it is unknown if ACM is present in the project work area, the asbestos database and shop and real property records would be reviewed to determine the presence of ACM. If it is still unknown if ACM is present in the work area, sampling and analysis for asbestos would be conducted. Any exposed friable asbestos would be removed in accordance with all applicable Federal, state, local, and USAF rules and regulations. Before initiating the ACM work, required notifications to the Spokane Regional Clean Air Agency would be completed. No work on an ACM project would be conducted unless it is performed by persons with current certificates of training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of within 10 days of removal at a waste disposal site authorized to accept such waste. Additionally, all handling and disposal of ACM wastes would be performed in accordance with the Fairchild AFB Asbestos Management Plan (Fairchild AFB 2011a) and in compliance with Federal, state, and local regulations.

A comprehensive base-wide LBP survey at Fairchild AFB has not been completed. In accordance with the Fairchild AFB Lead Exposure and Lead-Based Paint Management Plan (Fairchild AFB 2011b), all renovation, construction, demolition, and renovation projects proposed at Fairchild AFB would be reviewed to determine if LBP is present and if it would be disturbed. To the extent possible, the presence of LBP within the work area would be identified prior to work beginning. Additionally, an LBP survey would be completed prior to any renovation or demolition work at pre-1980 facilities at Fairchild AFB. Volume II, Appendix E,

Table E-3, contains a list of buildings proposed for modification and their potential to contain LBP. If it is unknown if LBP is present in the project work area, the LBP database and shop and real property records would be reviewed to determine the presence of LBP. If it is still unknown if LBP is present in the work area, sampling and analysis for LBP would be completed. Additionally, the handling and disposal of LBP wastes would be in accordance with the Fairchild AFB Lead Exposure and Lead-Based Paint Management Plan (Fairchild AFB 2011b) and in compliance with Federal, state, and local requirements and regulations.

Because some of the buildings proposed for renovation or demolition were constructed prior to 1979, it is assumed that they could have polychlorinated biphenyl (PCB)-containing equipment (fluorescent light ballasts). The buildings that would be affected by demolition, renovation, or alteration, their years of construction, and their potential for PCB-containing equipment to be present are summarized in Volume II, Appendix E, Table E-3. In facilities proposed for demolition or renovation, any potential PCB-containing equipment not labeled PCB-free or missing date-of-manufacture labels would be removed and handled in accordance with Federal and state regulations and the base Hazardous Waste Management Plan (HWMP) (Fairchild AFB 2011c). PCB-containing materials would be transported off base and disposed of at a hazardous waste disposal facility (Fairchild AFB 2012c).

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the KC-46A MOB 1 scenario at Fairchild AFB, and long-term benefits from removal of toxic substances are anticipated.

4.2.9.2 Hazardous Waste Management

Section 4.1.9.4 describes the hazardous waste management specific to the KC-46A aircraft. Fairchild AFB would continue to operate as a large-quantity generator (LQG) and would generate hazardous wastes during various operations and maintenance activities associated with the replacement of KC-135 mission. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. No new hazardous materials would be added that exceed the base's current hazardous waste processes. The Fairchild AFB HWMP (Fairchild AFB 2011c) would be updated to reflect any change in disposal procedures and any changes of hazardous waste generators and waste accumulation points. No adverse impacts are anticipated from the increased volume. All hazardous wastes would be handled and managed in accordance with Federal, state, and local regulations.

4.2.9.3 Environmental Restoration Program

Some of the proposed construction, demolition, and renovation projects associated with the KC-46A MOB 1 scenario at Fairchild AFB are on or adjacent to active ERP sites. The USAF would coordinate with the restoration office before any construction, demolition, or renovation is initiated. Although formal construction waivers are not required, the USAF does require reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current EIAP processes, as specified in AFI 32-7061. Additionally, new construction within ERP sites at Fairchild AFB must be approved by the Facility Utilization Board and coordinated with the 92nd Civil Engineer Squadron.

The USAF will ensure that these projects are coordinated with ongoing remediation or investigation activities at any ERP site. However, if existing plans and procedures are followed,

there would be no anticipated impacts on these ERP sites. During C&D activities, there is the potential to encounter contaminated soil and groundwater in areas associated with ERP sites. There is also the possibility that undocumented contaminated soils from historical fuel spills may be present. If encountered, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable Federal, state, and local regulations; AFIs; and base policies. If soil or groundwater contaminants are encountered during C&D activities, health and safety precautions, including worker awareness training, may be required.

The MOB 1 scenario at Fairchild AFB would require the demolition of Buildings 1011, 1013, 1015, 1017, 1018, 1019, 1021, 1023, and 2120; the renovation or addition/alteration of Buildings 1025, 2005, 2007, 2040, 2045, 2050, and 2097; and the construction of new aprons, a fuel hydrant loop, and a fuel stand within the footprint of ERP Site SS-39. This ERP site consists of TCE-contaminated soil and a TCE and carbon tetrachloride-contaminated groundwater plume extending across the base over an area of approximately 2 miles long and a third of a mile wide. Groundwater within Site SS-39 is encountered at depths ranging from 3 to about 50 feet bgs. Based on the shallow water table in some areas of this site, it is possible that groundwater may be encountered during C&D. ERP Site SS-39 is currently in the remedial action phase and awaiting a Record of Decision (ROD) (Fairchild AFB 2011f, 2013).

ERP Site SS-26 is located along Taxiway 1, adjacent to Buildings 1015, 1017, and 1019, which would be demolished under this alternative. This site is also within the proposed new aprons and fuels upgrade construction area. Contamination associated with this site, benzene in the groundwater, is attributed to leaking jet fuel distribution lines. Groundwater at the site is typically at 6 to 10 feet bgs. Based on the relatively shallow water table, it is possible that groundwater could be encountered during construction. The selected remedy at ERP Site SS-26 is long-term monitoring (Fairchild AFB 2012e, 2013).

ERP Site SS-27 is located east and northeast of Building 1011, which would be demolished under the MOB 1 scenario at Fairchild AFB. This site is also within the proposed new aprons and fuels upgrade construction area. ERP Site SS-27 is associated with a flightline fuel spill that was closed under No Further Action with approval from USEPA and Washington State Department of Ecology.

ERP Site TU-500, the West Defuel Site, is located just north of Buildings 1011 and 1013. These buildings would be demolished as part of the MOB 1 scenario at Fairchild AFB. TU-500 is also within the proposed new aprons and fuels upgrade construction area. This site is associated with a UST that was removed in 1995 and is currently awaiting remedial investigation (some interim remedial action cleanup has occurred). VOCs, mainly benzene, toluene, ethylbenzene, and xylene (BTEX), in the groundwater and soil are the contaminants associated with this site. Groundwater at the site is typically around 8 feet bgs and may be encountered during C&D (Fairchild AFB 2011g, 2013).

ERP Site TU-508 is located under and around Building 2050. This building would be renovated and incur construction as part of the MOB 1 scenario at Fairchild AFB. ERP Site TU-508 is associated with the removal of USTs in 1994 and is currently awaiting completion of a Site Inspection. Lead in soil is the contaminant associated with this site.

There are 41 groundwater monitoring wells (MW-32, MW-33, MW-34, MW-35, MW-66, MW-67, MW-67A, MW-67B, MW-68, MW-107, MW-111, MW-112, MW-183, MW-186, MW-188, MW-189, MW-190, MW-264, MW-297, MW-328, MW-330, MW-334, MW-375, MW-386, MW-387, MW-388, MW-391, MW-392, MW-404, MMW-1013-2, MMW-1013-3, MMW-1013-4, MMW-1015-2, MMW-1015-3, MMW-1015-4, MMW-1017-2, MMW-1017-4,

MMW-1019-3, WDF-MP-9, WDF-MP-10 and WDF-MP-15) located within or near the proposed new aprons and fuels upgrade construction area that may need to be modified or abandoned and replaced.

4.2.10 Socioeconomics

4.2.10.1 Population

The current personnel at Fairchild AFB and the projected change anticipated to support the KC-46A MOB 1 scenario are provided in Table 2-10. Implementation of the MOB 1 scenario would potentially add up to 1,095 people to Spokane County, resulting in an approximate 0.2 percent county population increase. This potential increase is based on the assumption that the 1 DoD civilian, 35 part-time Guardsmen, and 20 contractors would be from Spokane County.

4.2.10.2 Economic Activity (Employment and Earnings)

As shown in Table 2-10, implementation of the MOB 1 scenario at Fairchild AFB would increase the work force by 438 total personnel (after taking into consideration the manpower decrease associated with the KC-135 drawdown). The personnel would comprise 417 full-time military, 1 DoD civilian, and 20 contractors. The addition of 438 personnel at Fairchild AFB would increase on-base jobs from 4,486 to 4,924, or an approximate 9.7 percent increase. The IMPLAN model calculates that approximately 303 indirect and induced jobs in the ROI would be created by implementation of the KC-46A MOB 1 scenario, with most of the jobs being created in industries such as food services, offices of physicians and health practitioners, and private hospitals. With a 2012 unemployment rate of 8.6 percent (the most recent annual average for labor force data by county), it is expected that the local labor force would be sufficient to fill these new jobs without a migration of workers into the area.

Construction activities, in general, provide economic benefits to the surrounding areas through the employment of construction workers, as well as the purchase of materials and equipment. These construction activities would be temporary and would only provide a limited economic benefit. For every $100 million spent on construction of other new nonresidential structures in the ROI, an estimated 1,442 direct, indirect, and induced jobs would be created (MIG 2012). The USAF estimates that approximately $292 million in construction expenditures would be associated with the MOB 1 scenario at Fairchild AFB. This could generate approximately 3,022 jobs primarily within the construction industry or related industries, including food services, retail stores, and architectural and engineering services (MIG 2012). Since the construction activities are scheduled over several years and it would be possible for a single worker to work on multiple projects, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs. The indirect and induced income associated with construction expenditures is estimated to be approximately $65.5 million. These jobs, and the related income, would be temporary during the construction activity.

4.2.10.3 Housing

Implementation of the MOB 1 scenario would potentially generate a need for approximately 417 housing units. This is based on the difference between the drawdown of 1,239 full-time military personnel relative to the 1,656 incoming full-time military personnel and the assumption that only full-time military personnel would require housing. Under these assumptions and based on the number of vacant homes described in Section 3.2.10.1.3, the housing market in the ROI would be anticipated to support this need. However, prior to implementing the MOB 1 scenario, an HRMA would be required to determine the number of suitable and available housing units

within the HRMA-defined market area (20 miles or one-hour commute drive from base gate, whichever is shorter). No incoming students would be associated with the MOB 1 scenario at Fairchild AFB.

4.2.10.4 Education

As shown in Table 2-10, the overall change in the number of military dependents and family members accompanying additional USAF personnel associated with the KC-46A MOB 1 scenario and departing with the KC-135 mission would be approximately 678 persons. The total number of school-aged children was estimated at 1.5 times 65 percent of full-time military personnel only for the KC-46A MOB 1 scenario and the existing KC-135 mission. Therefore, approximately 407 students would be anticipated to enter the Spokane Public School District. This change represents a potential 1.4 percent increase in the total enrollment of the Spokane Public School District. Based on the number of schools in the county and the current class sizes, the schools would have the capacity to support the incoming students. The students entering the local schools would be of varying ages and would be expected to live in different parts of Spokane County. However, space available for new enrollments depends on the timing of the relocation and which schools the students would attend. A large influx of students over a short period would result in capacity constraints and would require additional personnel.

4.2.10.5 Public Services

Spokane County represents a large community with police, fire, and other services. The addition of approximately 1,095 USAF-related personnel and dependents would represent a 0.2 percent increase of the existing county population. The increase would not be expected to affect police, fire, or other services.

4.2.10.6 Base Services

Base services have adequate capacity in the CDC, housing, fitness, and dining facilities under the existing infrastructure to support the proposed MOB 1 scenario due to the drawdown of the KC-135 mission.

4.2.11 Environmental Justice and the Protection of Children

Analysis of the MOB 1 scenario noise contours relative to the baseline contours at Fairchild AFB indicates that off-base populations of minorities, low-income persons, and children would not be exposed to noise levels above what is occurring under the baseline conditions. Therefore, implementation of the MOB 1 scenario at Fairchild AFB is not anticipated to result in disproportionate impacts on these off-base populations (see Table 4-15).

Table 4-15. Percentage of Off-Base Population Potentially Exposed to Noise Levels of 65 dB DNL or Greater for Fairchild AFB

Scenario	Percentage Minority		Percentage Low-Income		Percentage Children (Under 18)	
	65–69 dB DNL	70–74 dB DNL	65–69 dB DNL	70–74 dB DNL	65–69 dB DNL	70–74 dB DNL
MOB 1	15%	0%	26%	0%	20%	0%
Baseline (Existing Conditions)	15%	18%	26%	0%	20%	0%
Region of Comparison	13%		14%		23%	

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4.3 GRAND FORKS AIR FORCE BASE (MOB 1)

This section of Chapter 4 presents the operational and environmental factors specific to Grand Forks AFB. Section 2.4 describes the facilities and infrastructure, personnel, and flight operations requirements of the KC-46A MOB 1 scenario and the specific actions at Grand Forks AFB that would be required to implement this scenario. As described in Section 4.5, the No Action Alternative would mean that the KC-46A MOB 1 scenario would not be implemented at Grand Forks AFB at this time. In addition to no facility or personnel changes, there would be no change in based aircraft at Grand Forks AFB and existing remotely piloted aircraft (RPA) operations at Grand Forks AFB would continue as described for baseline conditions. The 319th Air Base Wing (ABW) would continue their base operating and direct operation support mission as described under baseline conditions.

4.3.1 Noise

4.3.1.1 Base Vicinity

KC-46A aircraft are louder than the propeller-driven MQ-1 Predator and MQ-9 Reaper RPA but are not as loud as the jet-powered RQ-4 Global Hawk aircraft in typical landing and takeoff configurations (see Table 4-16). Aircraft flying at higher altitudes may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly lower noise levels than shown in the table. KC-135 aircraft, which were based at Grand Forks AFB until recently, are slightly louder than the KC-46A in both landing and takeoff configurations.

Table 4-16. Aircraft Noise Level Comparison at Grand Forks AFB

Aircraft	Power Setting	Sound Exposure Level at Overflight Distance (in decibels)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
KC-46A	60% N1	96	91	85	79	70	61
Predator (MQ-1)	50% RPM	77	73	68	63	56	49
Reaper (MQ-9)	50% RPM	82	78	73	68	60	53
Global Hawk (RQ-4)	87% RPM	101	97	92	86	78	70
Takeoff							
KC-46A	92% N1	107	102	96	88	78	69
Predator (MQ-1)	100% RPM	87	82	78	72	65	58
Reaper (MQ-9)	100% RPM	85	81	76	72	65	58
Global Hawk (RQ-4)	100% RPM	117	113	108	102	93	85

Key: Power Units: N1 – engine speed at Location No. 1; RPM – revolutions per minute
Source: NOISEMAP 7.2 Maximum Omega 10 Results; T-41 used as surrogate noise source for MQ-1; Cessna 441 used as surrogate noise source for MQ-9 (noise reduced 3 dB to account for one TPE331 engine on MQ-9 rather than two on Cessna 441); T-45 used as surrogate noise source for RQ-4.

KC-46A aircraft would use similar flight procedures to those used by the KC-135 aircraft that had been based at Grand Forks AFB until recently. Of the proposed KC-46A operations, approximately 25 percent of takeoffs and 40 percent of landings would be tactical. Tactical operations are designed to reduce the risk of ground-based threats to the aircraft in forward operating locations. The KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.

As part of the ANG associate unit operations, the KC-46A would be flown on some weekend days as part of Guard associate unit operations. KC-46A training flights would be conducted 312 days per year. However, mission sorties, in which the aircraft is supporting real-world operations, could take place on any day of the year. Currently, aircraft at Grand Forks AFB are operated approximately 260 days per year, ANG aircraft are operated 156 days per year, and the Air Combat Command (ACC) Global Hawk aircraft are operated 130 days per year.

The RPA missions conduct approximately 14,946 airfield operations per year at Grand Forks AFB. Implementation of the KC-46A MOB 1 scenario would add 33,710 airfield operations per year, resulting in 48,656 annual operations. However, this airfield operation tempo would be similar to the missions that Grand Forks AFB has hosted in the past.

Noise levels near Grand Forks AFB were calculated using the computer program NOISEMAP (Version 7.2), with the location-specific effect of terrain and ground impedance included in the analysis. Details of the methods used to calculate noise levels and the population affected by elevated noise can be found in Volume II, Appendix B, Section B.1.3. Annoyance is a subjective response that is often triggered by interference of noise with activities. Individuals engaged in activities more easily disrupted by noise (e.g., conversation, sleeping, or watching television) are more likely to become annoyed than others. Although the reaction of an individual to noise depends on a wide variety of factors, social surveys have found a correlation between the time-averaged noise level as measured in DNL and the percentage of the affected population that is highly annoyed (see Volume II, Appendix C, Section C.1.3.1). It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed by noise, and this has been adopted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.3.7 and Volume II, Appendix C, Section C.1.3.2).

Figure 4-4 depicts the noise contours associated with implementation of the KC-46A MOB 1 scenario at Grand Forks AFB. The noise contours are displayed in 5 dB increments from 65 dB DNL to 85 dB DNL and are compared to the baseline contours. Details of the methods used to calculate noise levels and population affected by elevated noise can be found in Volume II, Appendix B, Section B.1.3. Implementation of the KC-46A MOB 1 scenario would increase the number of off-base acres affected by noise levels equal to or greater than 65 dB DNL from 0 to 62 acres (see Table 4-17). Although there is an increase in off-base acres exposed to 65 dB DNL, the estimated number of off-base residents exposed to 65 dB would remain zero. Analysis of aerial photography of the area did not reveal residences within the 65 dB contour.

Table 4-17. KC-46A MOB 1 Scenario Noise Impacts Relative to Baseline Noise at Grand Forks AFB

Noise Level (dB DNL)	Baseline Conditions			MOB 1 Scenario		
	Off-Base Population	Off-Base Acres	On-Base Acres	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	0	0	341	0	62	557
70–74	0	0	114	0	0	322
75–79	0	0	10	0	0	175
80–84	0	0	0	0	0	15
≥85	0	0	0	0	0	2
Total	**0**	**0**	**465**	**0**	**62**	**1,071**

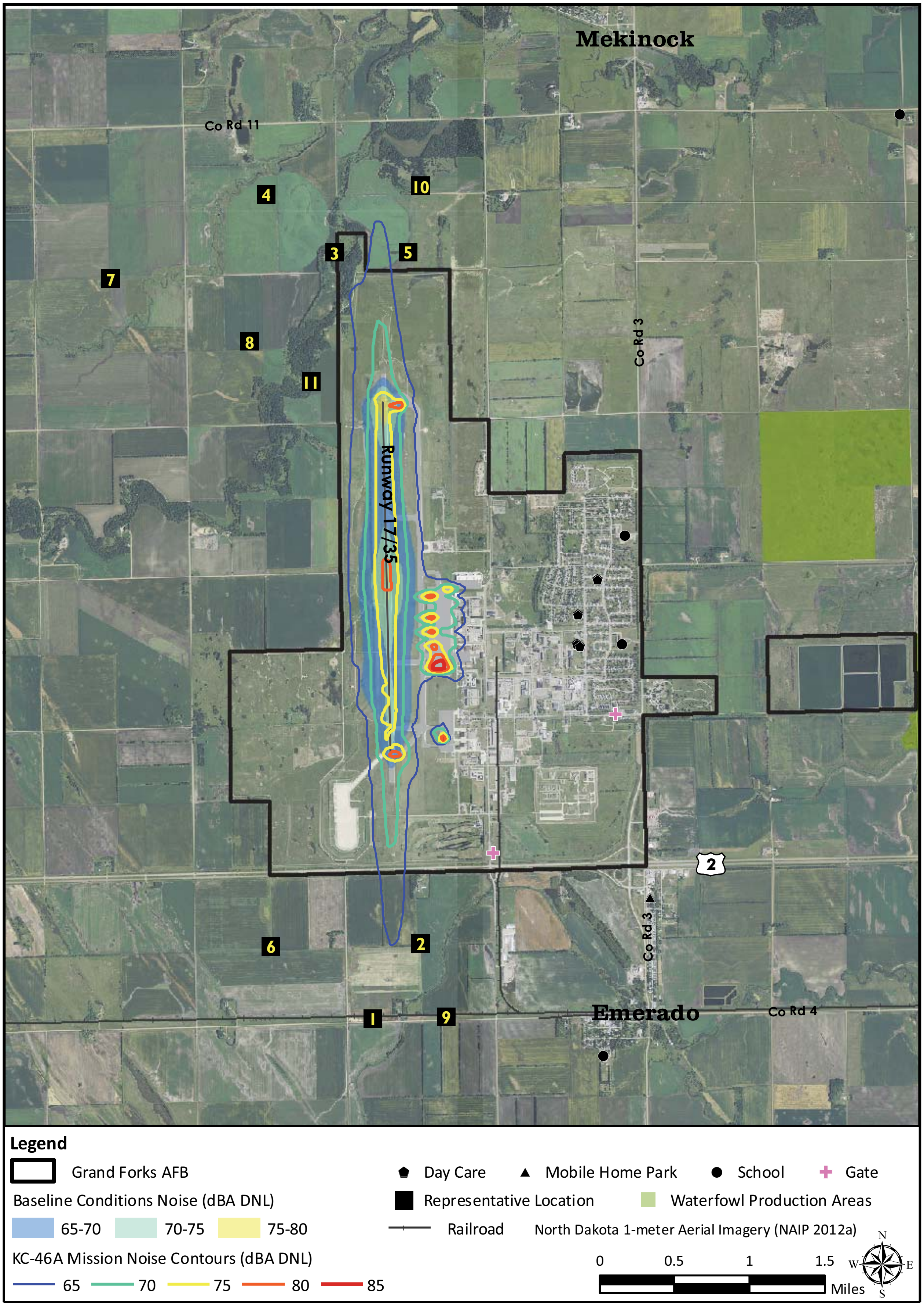

Figure 4-4. KC-46A MOB 1 Scenario and Baseline Noise Contours at Grand Forks AFB

Implementation of the KC-46A MOB 1 scenario at Grand Forks AFB would not expose off-base areas to noise levels greater than 80 dB DNL. Sixteen acres on Grand Forks AFB would be exposed to noise levels of 80 dB DNL or greater. No structures would be affected by noise levels of 80 dB DNL or greater. Hearing loss risk among people working in high-noise environments on Grand Forks AFB would continue to be assessed and managed in accordance with DoD, OSHA, and NIOSH regulations regarding occupational noise exposure.

Table 4-18 compares noise conditions at several representative locations in the area surrounding Grand Forks AFB under the baseline and MOB 1 conditions. The representative locations, depicted on Figure 4-4, were established based on central points of U.S. Census subdivisions and therefore do not represent a specific noise-sensitive receptor. KC-46A operations would result in substantial DNL increases, with the largest increase (13 dB) occurring at Location 7. These increases are substantial due to the lack of KC-135 aircraft and are the result of more frequent aircraft noise. This is reflected in the ranges of five loudest individual overflight events at the representative locations. At 2 of the 11 locations studied, noise resulting from KC-46A MOB 1 scenario operations would generate the highest SEL. At 8 of the 11 locations studied, KC-46A operations would make up one or more of the remaining top five loudest operation types, increasing the low-end value of the top five SEL range relative to baseline conditions (see Table 4-18). At the locations surveyed, based Global Hawk, proposed KC-46A, and transient aircraft (i.e., KC-10A or KC-135) departure and closed pattern operations would generate the highest SELs. Table C-1-3 in Volume II, Appendix C, Attachment C-1, details the major noise-contributing operations at each location under baseline conditions at Grand Forks AFB.

Table 4-18. KC-46A MOB 1 Scenario Noise Levels at Representative Locations Near Grand Forks AFB

Location ID	Baseline Conditions		MOB 1 Scenario	
	DNL (dB)	Top 5 SELs (dB)[a]	DNL (dB)	Top 5 SELs (dB)[a]
1	53	91–97	60	92–97
2	54	93–97	59	93–97
3	54	90–97	63	90–97
4	49	81–93	57	85–93
5	55	93–98	60	93–98
6	47	80–92	57	86–94
7	46	78–85	59	83–94
8	49	80–93	52	85–93
9	50	87–96	54	88–96
10	53	89–96	57	90–96
11	54	85–97	57	88–97

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Attachment C-1).

No tribal lands are located in the immediate vicinity of Grand Forks AFB, and no cultural resource sites (i.e., historic properties per 36 CFR §800.16) or sacred sites (under EO 13007) of importance to tribes are identified within or near the base. During the public involvement phases of this EIS and the NHPA Section 106 planning processes, two tribes issued concern that overflight of aircraft may have the potential to cause a disruption to fasting and prayers of traditional tribal practitioners. An onsite meeting was requested by one of these tribes. On 5 December 2013, USAF representatives met with tribal council members to informally discuss project alternatives. Tribal council members voiced concern over noise generated from flight

operations. KC-46A flight operations in areas not immediately adjacent to Grand Forks AFB would be at high altitudes (18,000 feet mean sea level [MSL]; 17,000 feet AGL); noise generated during these operations is similar to ambient noise levels and subsequently would not be expected to cause disruption to activities. Further discussion of this and other tribal consultation can be found in Section 4.3.6.

Turtle River State Park is located approximately 3 miles west of Grand Forks AFB. Although certain KC-46A operations would be audible at Turtle River State Park, noise levels at the park would be substantially less than 65 dB DNL. Changes to type, frequency, and timing of aircraft noise at the park would not be expected to result in significant noise impacts. Further discussion of the effects of noise on land use can be found in Section 4.3.7.

As described in Section 2.3.3, IOT&E operations would be conducted at the MOB 1 location. IOT&E operations would be expected to be indistinguishable to members of the public from standard MOB 1 flying operations and would taper off before the MOB 1 reaches full operations tempo such that annual operations listed counts for MOB 1 would not be exceeded.

C&D activities in support of the proposed beddown would be conducted in the context of an active AFB where aircraft and other types of noise are a normal part of the environment. Although equipment would be muffled, construction activities unavoidably generate localized increases in noise qualitatively different from aircraft noise. For example, a typical backhoe, dozer, and crane generate up to approximately 78, 82, and 81 dB, respectively, at a distance of 50 feet (FHWA 2006). Construction noise would be minimized in accordance with local regulations and would be temporary and intermittent, lasting only the duration of the project. Furthermore, construction activities would be expected to take place during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Some people living or working near the construction sites may notice and be annoyed by the noise, but noise impacts would not be substantial enough to be considered significant.

4.3.2 Air Quality

The following air quality analysis estimated the magnitude of emissions that would result from the proposed KC-46A construction and operational activities at Grand Forks AFB. The immediate area surrounding Grand Forks AFB within Grand Forks County currently attains all of the NAAQS. Therefore, the analysis used the PSD threshold of 250 tons per year of a pollutant as an indicator of significance of projected air quality impacts. Volume II, Appendix D, Section D.3.1, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from proposed sources at Grand Forks AFB.

Construction – The proposed KC-46A MOB 1 scenario at Grand Forks AFB would require construction and/or renovation of airfield facilities, including training facilities, hangars, taxiways, and maintenance and fueling facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions resulting from the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) resulting from the operation of equipment on exposed soil. Construction activity data were developed to estimate proposed construction equipment usages and associated combustive and fugitive dust emissions for each project alternative.

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollutant Emission Factors*, AP-42, Volume I (USEPA 1995); the USEPA NONROAD2008a model for nonroad construction equipment (USEPA 2009a); and the USEPA MOVES2010b model for on-road vehicles (USEPA 2013b).

Inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels.

Table 4-19 presents estimates of emissions from construction activities that would occur as a result of implementing the KC-46A MOB 1 scenario at Grand Forks AFB. These data show that, for each year of construction, total emissions would remain below the PSD thresholds used to indicate significance or insignificance. Therefore, temporary construction emissions from KC-46A construction activities would produce less than significant air quality impacts. The main sources of PM_{10}/$PM_{2.5}$ emissions would be fugitive dust from the operation of equipment on unpaved surfaces.

Table 4-19. Annual Construction Emissions Under the MOB 1 Scenario at Grand Forks AFB

Year/Construction Activity	Air Pollutant Emissions (tons per year)						
	VOCs	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_{2e} (mt)**
CY 2014							
Demolish All Buildings	0.01	0.10	0.12	0.00	0.09	0.02	18
Total Building Development	3.61	19.64	33.90	0.92	85.81	11.55	4,472
Parking Apron/ Fuels Hydrant Upgrade	0.09	0.49	0.84	0.02	0.51	0.13	110
Airfield Lighting Vault	0.00	0.01	0.02	0.00	0.00	0.00	3
Runway and Overrun Repairs	3.70	24.89	39.26	0.85	4.30	4.22	6,303
Taxiway A Renovations	0.12	0.79	1.26	0.03	0.17	0.14	203
New Taxiway and Parking Apron	0.05	0.31	0.49	0.01	0.06	0.05	78
Total CY 2014	**7.58**	**46.23**	**75.90**	**1.84**	**90.95**	**16.11**	**11,188**
CY 2015							
Total Building Development	0.47	2.57	4.62	0.13	2.80	0.68	639
Parking Apron/ Fuels Hydrant Upgrade	0.06	0.28	0.46	0.01	0.10	0.05	56
Roads and Parking Upgrades – Asphalt	0.00	0.00	0.01	0.01	0.01	0.00	1
New Taxiway and Parking Apron	0.09	2.38	0.60	0.01	0.09	0.07	107
Total CY 2015	**0.62**	**5.23**	**5.68**	**0.16**	**3.00**	**0.79**	**803**
CY 2016							
Total Building Development	0.03	0.16	0.31	0.01	0.14	0.04	45
Roads and Parking Upgrades – Asphalt	0.00	0.01	0.01	0.00	0.01	0.00	2
Total CY 2016	**0.54**	**2.96**	**5.87**	**0.17**	**8.04**	**1.26**	**984**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

Operations – Sources associated with operation of the proposed KC-46A MOB 1 scenario at Grand Forks AFB would include (1) operations and engine maintenance/testing of aircraft, (2) onsite POVs and GMVs, (3) offsite POV commutes, (4) AGE, (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and other sources. Operational data used to calculate projected KC-46A aircraft emissions were obtained from data used in the project noise analyses (see Section 4.3.1). Factors used to calculate combustive emissions for the KC-46A aircraft were based on emissions data developed by Pratt and Whitney for the PW4062 engine (ICAO 2013b). The operational times in mode for the KC-46A engine were based on those for the KC-135 aircraft (Air Force Civil Engineer Center 2013).

Emissions from most non-aircraft sources generated by the proposed KC-46A operations were estimated by multiplying existing emissions for these sources at Grand Forks AFB by the ratio of total employment populations associated with the KC-46A beddown and baseline conditions at Grand Forks AFB. The air quality analysis used CY 2012 to define existing emissions, as it included the most recent calendar year of operational activities at Grand Forks AFB (see Table 3-23). However, because no similar aircraft are located at Grand Forks AFB, emissions from the usage of AGE by the KC-46A are based on AGE usages for existing KC-135 aircraft at Fairchild AFB. In addition, VOC emissions from mobile fuel transfer operations were assumed to be the same as those estimated for the proposed KC-46A MOB 1 scenario at Fairchild AFB.

The analysis of proposed aircraft operations is limited to operations that occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

The air quality impact analysis of the KC-46A MOB 1 scenario proposed for Grand Forks AFB is based on the increase in emissions associated with the beddown of 36 KC-46A aircraft. To produce a conservative analysis, it was assumed that all KC-46A aircraft would become operational at Grand Forks AFB in CY 2016.

Table 4-20 summarizes the annual operational emissions that would result from implementation of the KC-46A MOB 1 scenario at Grand Forks AFB. These data show that the increase in emissions from the addition of 36 KC-46A aircraft would not exceed 250 tons per year for VOCs, SO_x, PM_{10}, or $PM_{2.5}$. Therefore, implementing the KC-46A MOB 1 scenario at Grand Forks AFB would produce less than significant impacts on these pollutant levels. However, these data also show that the increase in CO and NO_x emissions would exceed 250 tons per year. KC-46A aircraft operations and on-wing engine testing activities are the primary contributors to these emission increases.

The majority of CO and NO_x emissions would result from the operation of KC-46A aircraft up to an altitude of 3,000 feet AGL and across the several square miles that make up the Grand Forks AFB airspace and adjoining aircraft flight patterns. These emissions would be adequately dispersed through this volume of atmosphere to the point that they would result in no substantial ground-level impacts in a localized area. Grand Forks County generates relatively low amounts of CO and NO_x emissions (see Table 3-22) and it attains all NAAQS. As a result, proposed CO and NO_x emissions resulting from KC-46A operations, in combination with existing emissions, would likely not be substantial enough to exceed an ambient air quality standard. Therefore, the proposed KC-46A operations at Grand Forks AFB would produce less than significant air quality impacts.

Table 4-20. Annual Operations Emissions Under the MOB 1 Scenario at Grand Forks AFB, CY 2016

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-46A Aircraft Operations	50.07	201.74	837.57	45.42	2.92	2.49	125,648
On-Wing Aircraft Engine Testing – KC-46A	14.39	49.54	28.94	2.34	0.21	0.19	6,286
Aerospace Ground Support Equipment – KC-46A	0.59	4.22	4.80	0.18	0.71	0.65	857.54
Unmanned Aircraft System Operations	0.56	2.48	12.73	1.04	0.23	0.23	2,910
Transient Aircraft	0.52	1.90	1.18	0.12	0.29	0.29	199
On-Wing Aircraft Engine Testing – Unmanned Aircraft Systems	0.17	0.71	0.80	0.10	0.02	0.02	262
AGE – Existing Aircraft	0.04	0.31	0.35	0.01	0.05	0.05	63
Government-Owned Vehicles	0.02	0.43	0.47	0.00	0.03	0.02	141
Privately Owned Vehicles – On Base	0.24	12.63	2.38	0.03	0.20	0.12	2,121
Privately-Owned Vehicles – Off Base	13.64	102.30	17.14	0.26	2.09	6.28	16,654
Mobile Fuel Transfer Operations	0.36	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	37.95	21.35	28.09	0.17	13.48	2.25	[a]
Total Grand Forks AFB Emissions – MOB 1 Scenario	**118.55**	**397.60**	**934.45**	**49.67**	**20.21**	**12.58**	**155,141**
Existing Grand Forks AFB Emissions	**37.47**	**111.21**	**53.46**	**1.56**	**10.24**	**2.95**	**15,423**
Grand Forks AFB MOB 1 Scenario Minus Existing Emissions	**81.08**	**286.39**	**880.99**	**48.12**	**9.98**	**9.63**	**139,718**
MOB 1 Scenario Net Emissions Increase Fraction of Grand Forks County Emissions	**0.01**	**0.02**	**0.22**	**0.07**	**0.001**	**0.003**	**0.29**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

Early in its planning, the USAF reconsidered its operational assumptions and projections to avoid or reduce potential impacts to the extent feasible. This resulted in the development of alternatives that reduced the emissions of criteria pollutants to the extent feasible by reducing the number of near-field operations, such as landing and take-off operations. At this time, the USAF is not aware of any other feasible mitigations that could be applied to further reduce the emissions impact from KC-46A aircraft operations and on-wing engine testing activities.

Proposed operations under the MOB 1 scenario at Grand Forks AFB would emit HAPs that could potentially impact public health. Proposed KC-46A aircraft operations and on-wing engine

testing activities would generate the majority of HAPs from this scenario. As discussed above for proposed criteria pollutant impacts, since proposed KC-46A operations would occur intermittently over a volume of atmosphere, they would produce minimal ambient impacts of HAPs in a localized area.

In addition to presenting estimates of GHG emissions that would result from implementation of the KC-46A MOB 1 scenario at Grand Forks AFB, the following considers how climate change may impact the KC-46A beddown at Grand Forks AFB. For Grand Forks AFB, the projected climate change impact of concern is increased temperatures, as documented in *Global Climate Change Impacts in the United States* (USGCRP 2009). This report predicts that the region surrounding Grand Forks AFB will experience (1) shorter winters and warmer summers and (2) an increase in precipitation, particularly heavier rain showers. One of the main outcomes of these conditions will be increased flooding in the region. While operations at Grand Forks AFB have already adapted to past flooding in the region, exacerbation of these conditions in the future may increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts.

4.3.3 Safety

This section addresses the potential environmental consequences to flight and ground safety that could occur at or in the vicinity of Grand Forks AFB with implementation of the KC-46A MOB 1 scenario.

Grand Forks AFB has hosted many large aircraft missions in the past, and large aircraft airfield provisions remain in place. However, from a safety perspective, the current RPA missions are very different from tanker missions. The USAF routinely operates large aircraft on the same airfield with RPAs at locations worldwide and, although mixing RPAs with large aircraft is not common in the CONUS, proper planning for safety has proven to be successful in operating mixed aircraft at the same base. Special provisions have been incorporated into the KC-46A parking plan to avoid any safety issues associated with jet blast.

4.3.3.1 Flight Safety

Aircraft Mishaps – Reintroduction of an aerial refueling mission at Grand Forks AFB is not anticipated to increase the flight safety risk. As discussed previously, the accident rate for the KC-46A is expected to be similar to that of the commercial airframe upon which it is based. Using the accident rate of 0.36 per flight cycle, it is projected that the probability of a KC-46A accident in the vicinity of the airfield would be low (less than one every 100 years; see Volume II, Appendix B, Section B.3.3.1).

Therefore, implementation of the KC-46A MOB 1 scenario at Grand Forks AFB is not anticipated to result in any net increase in the safety risks associated with aircraft mishaps or any increase in the risks of occurrence of those mishaps.

Also, utilizing the former KC-135 flight patterns and the existing air refueling (AR) tracks, the KC-46A is not anticipated to create additional flight safety risks. The FAA requires air traffic control deconfliction of RPAs and manned aircraft operating in the Class D airspace around Grand Forks AFB. The basing of 36 KC-46A aircraft is not anticipated to increase the risk of aircraft accidents.

Bird/Wildlife-Aircraft Strike Hazard – The addition of 36 KC-46A aircraft and the associated operations would increase the risk of bird/wildlife-aircraft strike hazards at Grand Forks AFB. Grand Forks AFB has hosted multiple large aircraft missions in the past and is familiar with

implementation of BASH programs and the risk of bird/wildlife-aircraft strike hazard events in this area. Ongoing elements of the Grand Forks AFB BASH Plan (Grand Forks AFB 2009b) would continue, with updates as required to address the operations of the KC-46A.

Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology as a tool for analysis and correlation of bird habitat, migration, and breeding characteristics with key environmental and manmade geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings, which take place prior to any sortie.

With proposed KC-46A flight operations similar to those previously conducted by KC-135 aircraft at Grand Forks AFB, the overall potential for bird/wildlife-aircraft strikes is not anticipated to be significantly greater than past levels. All safety actions that were in place for KC-135 operations would be reinstituted for the KC-46A aircraft. Grand Forks AFB personnel have developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and have documented detailed procedures to monitor and react to heightened risk of bird strikes. When bird/wildlife-aircraft strike hazard risks increase, limits are placed on low-altitude flight and some types of training (e.g., multiple approaches, closed-pattern pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the potential for bird strikes is high within the airspace. KC-46A pilots would be subject to these procedures. Therefore, no significant impact would occur related to bird/wildlife-aircraft strike hazard issues.

4.3.3.2 Ground Safety

The basing and operation of 36 KC-46A aircraft would require close coordination between KC-46A aircrews, RPA pilots, and air traffic control. Operations and maintenance procedures conducted by base personnel would change from current conditions and procedures with AFIs modified to incorporate the new KC-46A. All current activities would continue to be conducted in accordance with applicable regulations, technical orders, and AFOSH standards.

The parking plan for the 36 KC-46A aircraft was specifically designed to minimize conflict with existing RPA missions. No unique construction practices or materials would be required as part of any of the renovation, addition, or construction projects associated with the KC-46A MOB 1 scenario at Grand Forks AFB. All renovation and construction activities would comply with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements. The USAF does not anticipate any significant safety impacts as a result of construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented. Proposed construction, renovation, and infrastructure improvement projects related to the KC-46A would be consistent with established APZs, and no significant impacts related to APZs would occur. See Volume II, Appendix B, Figure B-1, for the typical generic CZ and APZ dimensions.

The KC-46A would be operated in an airfield environment similar to the operational environment previously found at Grand Forks AFB. Since the KC-46A is a new airframe and would require response actions specific to the aircraft, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the KC-46A and associated equipment. With this update, the Grand Forks AFB airfield safety conditions would be similar to baseline conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

4.3.4 Soils and Water

All of the C&D activities associated with the proposed KC-46A MOB 1 scenario would occur within the Grand Forks AFB boundary. The majority of this work would occur on previously disturbed areas. The total disturbed area for the projects proposed as part of the KC-46A MOB 1 scenario would not exceed 35 acres (the area for new construction and additions/alterations).

For any projects that result in soil disturbance, the USAF would ensure that all construction activities are conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. The USAF would specify compliance with the stormwater discharge permit in the contractor construction requirements.

The Grand Forks AFB SWPPP for industrial facilities identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. The SWPPP would be updated to reflect the land disturbance associated with the proposed KC-46A development projects.

No sensitive groundwater resources, surface water resources, or floodplains are present within the project area.

4.3.5 Biological Resources

4.3.5.1 Vegetation

Implementation of the MOB 1 scenario at Grand Forks AFB would have similar potential impacts on vegetation as described for the MOB 1 scenario at Altus AFB. All of the projects would occur in currently developed or disturbed areas that provide little habitat value and are anticipated to result in no significant impacts on vegetation.

4.3.5.2 Wildlife

Potential impacts on wildlife would also be similar to the types of impacts previously described for implementation of the MOB 1 scenario at Altus AFB. Although wildlife may periodically use some of the areas planned for the development associated with the MOB 1 scenario, these areas do not likely function as important habitat for wildlife on the base. A combined corrosion control/general maintenance hangar and associated taxiway and apron are planned for a low area north of Building 649. This area contains potentially jurisdictional wetlands. This area contains cool season non-native grasses, and although it could provide some habitat for small mammals, birds, reptiles, and amphibians, it would not be considered high-value wetland habitat. Wetland removal or water quality reduction could decrease value as wildlife habitat. However, mitigation actions would be required to minimize any potential impacts. In addition, wetlands located in the cantonment area would represent a small percentage of similar habitat available in the surrounding region. Noise produced during construction and renovation activities would have a similar effect on wildlife as that described for the other alternative bases, and would result in no significant impacts.

Implementation of the MOB 1 scenario would result in an increase in the number of airfield operations, resulting in increased noise on and near the base similar to what has occurred in the recent past with other large aircraft missions.

As described in Section 4.3.1, noise contours would extend north and south of the base, with the greatest increase occurring in an approximately 1.5-mile arc west of the northern portion of the base. This arc is very similar to the noise contour associated with the previous KC-135 mission

and would overlap riparian habitat along the Turtle River at the base's northwest corner, as well as the state wildlife area adjoining the base's northern boundary.

Increased operations would increase the potential for aircraft to strike birds and other wildlife in the air and on the runway. However, continued adherence to the base's BASH Plan (Grand Forks AFB 2009b) would minimize the risk.

Overall effects on wildlife would be similar to those described for the other alternative bases proposed for the MOB 1 scenario. Significant wildlife impacts are not anticipated to result from implementation of the KC-46A MOB 1 scenario at Grand Forks AFB.

4.3.5.3 Special-Status Species

No bald eagle nests are known to occur on base. Bald eagles observed at Grand Forks AFB have been documented near the sewage lagoons, occasionally seen feeding on road kill in the area, and observed hunting in the Turtle River riparian area. The Grand Forks AFB Integrated Natural Resource Management Plan (INRMP) (Grand Forks AFB 2011a) contains projected bird monitoring and survey projects, including bald eagle nest surveys. Grand Forks AFB would coordinate with North Dakota Game and Fish if any nests are discovered. No significant impacts on bald eagle populations are anticipated due to the proposed action. Both the peregrine falcons and the yellow rail sighted at the base appear to be migratory species passing through the area. These species were observed in areas that would not be impacted by the facilities and infrastructure projects proposed as part of the MOB 1 scenario at Grand Forks AFB. No significant impacts are anticipated on these species.

There are no other federally listed bird species and/or designated critical habitat on Grand Forks AFB. There are no other state critically imperiled or imperiled bird species at Grand Forks AFB. There would be no significant impacts on special-status species resulting from implementation of the MOB 1 scenario at Grand Forks AFB.

None of the three state-classified plant species documented at Grand Forks AFB during a 2009 biological survey (Grand Forks AFB 2010a) occur within the proposed KC-46A MOB 1 scenario project areas.

Because these special-status plant species do not occur within the project areas, there would be no significant impacts on these species resulting from implementation of the MOB 1 scenario at Grand Forks AFB.

Two fisher carcasses discovered near the Main Gate in 2009 suggest potential fisher presence on Grand Forks AFB. Fishers predominantly inhabit dense low- to mid-elevation mesic forests with abundant physical structure near the ground. Fishers avoid areas with little or no overhead cover, but sufficient coarse woody debris, boulders, or shrub cover may provide suitable overhead cover in non-forested or otherwise open areas.

Potential suitable habitat available on base (such as shrubland and the Turtle River Woodlands to the north) does not occur within the proposed action area. Implementation of the MOB 1 scenario at Grand Forks AFB would not be likely to adversely affect the fisher.

There are no other federally or state-listed plant species and/or designated critical habitat. There would be no significant impacts on special-status species resulting from implementation of the MOB 1 scenario at Grand Forks AFB.

4.3.5.4 Wetlands

A number of small depressional wetlands are located throughout Grand Forks AFB. A preliminary jurisdictional wetland determination survey was conducted in June 2013 and identified approximately 2 acres of potential jurisdictional wetlands that would be impacted by the proposed action (see Figure 2-13).

Proposed construction sites for the new KC-46A Squadron Operation/Aircraft Maintenance Unit building, the Composite Shop, and the Flight Simulator and Building 622 (proposed for renovation) are located close to wetlands that could be affected by erosion and sedimentation, if stormwater run-off is not properly controlled from these sites (see Figure 2-13). It is anticipated that implementation of an effective SWPPP and standard construction practices would prevent stormwater run-off from construction areas from entering wetlands at the base.

A Finding of No Practicable Alternative (FONPA) would be prepared for this project should Grand Forks AFB be selected for the MOB 1 scenario. The FONPA would be prepared in accordance with Title 32 of the *Code of Federal Regulations* (CFR), Part 989, and AFI 32-7064, “Integrated Natural Resources Management.” The USAF would work with the U.S. Army Corps of Engineers (USACE) and North Dakota Department of Health to determine if any of the impacted wetlands are subject to regulation under Sections 401/404 of the Clean Water Act (CWA). If wetlands with a watershed greater than 80 acres are drained or filled, a permit is required from the North Dakota State Engineer. The USAF would work with regulators to determine any permit conditions, including mitigation requirements (as appropriate). Permit conditions would specify mitigative measures, such as standard construction practices required to prevent fugitive soil, sediment, and other potential contaminants from migrating off site into other waters of the United States. At a minimum, these construction practices would likely include installation of silt fencing and sediment traps and revegetation of disturbed areas with native plants as soon as possible to contain and prevent any offsite migration of sediment or eroded soils from the project area. These practices would also minimize effects on the area regarding its function as wildlife habitat.

4.3.6 Cultural Resources

At Grand Forks AFB, actions associated with the proposed KC-46A MOB 1 scenario include demolition of three buildings, renovation of eight buildings and runways/roads/taxiways/parking aprons, and additions and/or alterations to four buildings. Grand Forks AFB has determined that one of the buildings proposed to be renovated, Facility 221 (dormitory), is eligible for the NRHP. However, because it is addressed in the Advisory Council on Historic Preservation’s (ACHP) Program Comment for Unaccompanied Personnel Housing (ACHP 2006), completion of the mitigation measures specified in the program comment resolved any future adverse effects, including this project’s potential impacts. All other buildings associated with implementation of the KC-46A MOB 1 scenario at Grand Forks AFB have been evaluated for NRHP eligibility. None of these facilities have been determined eligible. The North Dakota SHPO has concurred with this finding and has also concurred that no historic properties would be affected (see Volume II, Appendix A, Section A.5.3).

No impact on archaeological historic properties is anticipated to result from implementation of the KC-46A MOB 1 scenario. Ground-disturbing activities would occur in previously disturbed contexts. Those areas not already beneath previously modified surfaces have been surveyed for the presence of archaeological resources; none have been located. It is unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, or addition. It is still possible that archaeological resources could be

buried on Grand Forks AFB (Grand Forks AFB 2012b). In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA, as specified in standard operating procedures described in the ICRMP (Grand Forks AFB 2012b).

No adverse Section 106 impacts to tribal resources are anticipated. Grand Forks AFB consulted with 23 tribes to determine whether there are any historic properties of religious or cultural significance within the project area. Information and advice was sought through both the NEPA and the NHPA Section 106 planning processes. These tribes are listed in Table A-1 in Volume II, Appendix A, Section A.3. No tribes identified specific properties of religious or cultural significance within the project area.

During the scoping and Draft EIS public comment periods, the Cheyenne River Sioux and the Standing Rock Sioux Tribes expressed concern about aircraft overflying tribal lands. The Standing Rock Sioux Tribe stated that the noise associated with training missions has the potential to disrupt fasting and prayers of traditional practitioners. Further coordination with this tribe included an explanation that KC-46A flight operations in areas away from Grand Forks AFB would occur at such high altitudes (above 18,000 feet MSL; 17,000 feet AGL) that noise generated during these operations would be similar to ambient noise levels and subsequently would not be expected to cause noise disruption to activities. After this further coordination, the Standing Rock Sioux indicated that they had no concerns regarding this project.

In addition to indicating the potential disruptions of aircraft overflying tribal land, the Cheyenne River Sioux Tribe requested to see the results of past cultural resource surveys on the base and expressed concerns related to the KC-46A project, including but not limited to adverse effects to sacred sites, properties of cultural and religious significance to tribes, traditional cultural properties, cultural resources (above and below ground), etc., on past, present, and future ancestral territories. The USAF informally met with the Cheyenne River Sioux Tribe to discuss these concerns. During the meeting, the tribe reiterated concerns for aircraft overflights and questioned the adequacy of past cultural resource surveys conducted at the base. Questions were also asked about hazardous waste management and spills at Grand Forks AFB. The USAF responded to these concerns with a letter that is included in Volume II, Appendix A, Section A.4.3.2. The letter indicated that the USAF does not anticipate any adverse impacts to historic properties of religious or cultural significance as a result of implementing the MOB 1 mission at Grand Forks AFB.

Seven additional tribes responded with requests for information or with confirmation of no objections to the proposed action. The base continued to consult with concerned tribes regarding the proposed action throughout the EIS process and conducted additional efforts to contact non-responsive tribes. All identified concerns regarding potential adverse Section 106 impacts to tribal resources from the proposed action were addressed. This consultation included additional telephone, e-mail, and letter correspondence, and, as described above, meetings with concerned tribes (see Volume II, Appendix A, Sections A.3, A.4, and A.7). While the USAF values its relationship with all tribes and will continue to consult on other planning efforts or matters of known or potential interest to tribes, Section 106 consultation on the KC-46A MOB 1 beddown proposed alternative at Grand Forks AFB is now complete.

4.3.7 Land Use

4.3.7.1 Physical Development

The proposed physical development associated with implementation of the KC-46A MOB 1 scenario at Grand Forks AFB would occur in the core part of the base between the airfield and the housing areas on the east side of the runway. The location of the sites and their proposed use

would conform to current and intended land uses for the base. Indirect effects from construction (such as noise, truck traffic, and dust) could result from implementation of the MOB 1 scenario. However, these effects would be temporary and minor; there would be no long-term effect. None of the physical development associated with implementation of the KC-46A MOB 1 scenario at Grand Forks AFB is anticipated to result in impacts to land use.

Implementation of the MOB 1 scenario at Grand Forks AFB would potentially require 1,724 housing units, for which the base has a limited supply. Additional housing requirements, whether filled by new privatized housing on base, vacancies in the local housing supply, or new residential development, are not anticipated to impact land use. Because the area surrounding the base is very rural with no amenities, it is unlikely that major new development would occur near the base. However, any development near the base would be required to obtain local review and approval. It is anticipated that the local planning community would coordinate closely with the base to maintain and control surrounding land uses to enforce the safety and protection of area residents.

4.3.7.2 Aircraft Operations

Although no large aircraft currently operate from Grand Forks AFB, prior to 2010, the base and surrounding communities hosted large aircraft missions for more than 50 years. With implementation of the MOB 1 scenario, the projected increase in aircraft operations would appear substantial; however, past operational levels were similar.

The primary source of impact on land use resulting from the proposed KC-46A MOB 1 scenario would be from noise. The land compatibility guidelines in Volume II, Appendix C, Section C.1.3.2, are applied in the evaluation of impacts at Grand Forks AFB.

Because there are no large aircraft at Grand Forks AFB and there are only three RPA missions, the current noise footprint is relatively small compared to previous noise footprints of the former KC-135 and B-52 missions. Approximately 544 acres on Grand Forks AFB would be exposed to new noise levels equal to or greater than 65 dB DNL. Family housing, schools, and day care/youth centers on base would remain well outside the area exposed to these levels of noise.

Similar to areas on the base, land outside of the base boundaries that was formerly exposed to these levels of noise would be affected by implementation of the KC-46A MOB 1 scenario. Approximately 62 acres off base would experience noise levels of 65 dB DNL or greater (see Figure 4-4), compared to no areas currently exposed to these levels from the RPA missions. Increases at any given location surrounding the base could be substantial, from 1 to 20 dB. The affected land outside the base is predominantly agricultural or undeveloped. One property with farm structures and a residence located north of the airfield would experience an increase to incompatible noise levels of about 70 dB DNL. A second location with farm structures to the south of the runway along Emerado Road would experience noise levels just above 65 dB DNL. Farm operations are compatible with these noise levels. The City of Emerado would remain outside the projected 65 dB DNL noise affected area, so that the residential areas in this community would remain compatible with the projected noise levels.

Zoning surrounding the base generally supports compatible land use planning and provides for review and protection of the areas surrounding the airfield. The Grand Forks County 2040 Comprehensive Plan recommends limiting residential density to one home per 15 acres in airfield reserve zones. Most of the change in off-base noise would occur in Mekinock Township, which manages its own zoning and development approvals.

The substantial increase in airfield operations at Grand Forks AFB has the potential to increase the potential for accidents. However, because the KC-46A is based on an existing commercial aircraft,

the accident rate is expected to be very low. Overall, no significant impacts on land use at Grand Forks AFB are anticipated to result from implementation of the KC-46A MOB 1 scenario.

4.3.8 Infrastructure

Refer to Section 3.3.8 for a description of existing infrastructure system capacities and conditions at Grand Forks AFB. Table 2-13 provides changes in population due to implementation of the MOB 1 scenario at Grand Forks AFB. These population changes and the proposed development were used to determine the impact on infrastructure. The maximum demand or impact on capacity was calculated for the potable water, wastewater, electric, and natural gas systems based on the change in population. To identify maximum demand or impact on these systems, any change in population was assumed to live on base. For the assessment of the transportation infrastructure, any change in population was assumed to reside off base.

4.3.8.1 Potable Water System

According to the U.S. Geological Survey's most recent data, the per capita domestic water consumption for North Dakota is 91 GPD (USGS 2005). It is anticipated that the additional personnel associated with the MOB 1 scenario would create an additional water use demand of 0.48 MGD. Implementation of the MOB 1 scenario would increase daily average demand from 16 percent to 41 percent of the pumping capacity from the City of Grand Forks.

4.3.8.2 Wastewater

The USEPA estimates that the average person generates approximately 100 GPD of wastewater between showering, toilet use, and general water use (USEPA 2013c). Using this amount as a planning factor and the change in population, the MOB 1 scenario would increase wastewater generation by 0.53 MGD. Based on current base population, it is estimated that 0.41 MGD of wastewater is currently being generated at Grand Forks AFB. The MOB 1 scenario would increase this discharge to 0.94 MGD, which is a 129 percent increase. The current base population utilizes approximately 42 percent of the treatment system capacity, based on the approximate 10,000-person design capacity of the treatment system. Implementation of the MOB 1 scenario would increase this discharge to 94 percent of the treatment system capacity. The lagoons have a total holding capacity of approximately 250 million gallons (MG) and have adequate capacity for future base expansion (Grand Forks AFB 2006a).

The impact of additional personnel on the local (City of Grand Forks) sanitary sewer system was also evaluated assuming that the change in population lived off base. Presently, the City of Grand Forks sanitary sewer system is designed to treat 10 MGD. Currently, the system treats 6.8 MGD on average. Adding 0.53 MGD to the system would increase the percentage of capacity used from 68 percent to 74 percent.

4.3.8.3 Stormwater System

The MOB 1 scenario would require demolition of facilities and construction of new facilities. This would take place within the existing developed base flightline and cantonment areas. Table 2-12 identifies projects associated with the MOB 1 scenario; the total potential disturbed area associated with these projects would not exceed 35 acres (the area for new construction and additions/alterations). During the short-term construction period for the MOB 1 scenario, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation

in disturbed areas as soon as possible after construction; constructing retention facilities and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales, and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures. An SWPPP update would be required, and the requirements of the EISA would be followed to maintain or restore, to the maximum extent practical, the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow.

4.3.8.4 Electrical System

To estimate the residential electrical use associated with personnel and their dependents, data from the USEIA were used to identify that residential consumers averaged about 13.77 MWH per person per year (330,738 users) in North Dakota in 2011 (the best available statistics), with a total of about 4,552,228 MWH consumed in 2011 (USEIA 2011). Using that amount as a planning factor along with the change in population, implementation of the MOB 1 scenario would increase the state annual residential use of electricity by 71,683 MWH per year. This represents less than 2 percent of total state-wide residential usage in 2011. Assuming the change in population resides on Grand Forks AFB and the population uses electricity at the 2011 residential average rate of 0.04 MWH per person per day, implementation of the MOB 1 scenario would increase the average daily use of electricity by 196.39 MWH per day. The MOB 1 scenario would increase average daily demand from 17 to 43 percent of base system capacity.

4.3.8.5 Natural Gas System

For residential consumption estimations, according to the USEIA, approximately 125,392 residential consumers in North Dakota used about 10,937 MMcf of natural gas in 2011 (USEIA 2013). This equates to an average of about 0.09 MMcf per person per year. Using that amount as a planning factor along with the change in population, the MOB 1 scenario would increase state annual residential demand for natural gas by 455 MMcf per year. This represents 5 percent of the state-wide residential natural gas usage in 2011. Assuming the change in the population resides on Grand Forks AFB and uses natural gas at the 2011 residential average rate of 0.24 Mcf per person per day, implementation of the MOB 1 scenario would increase the daily use of natural gas by 1,245 Mcf. The MOB 1 scenario would increase average daily natural gas use from 11 to 31 percent of the base capacity.

4.3.8.6 Solid Waste Management

Using methodology developed by the USEPA (USEPA 2009b) to determine the amount of C&D debris, implementation of the MOB 1 scenario would result in approximately 47,896 tons of C&D debris (USEPA 2009b). Solid waste generated from the proposed C&D activities would consist of building materials such as concrete, metals (e.g., conduit, piping, and wiring), and lumber.

Disposal of the debris would be through an integrated C&D debris diversion approach or removal to landfills. The integrated C&D debris diversion approach includes reuse, recycling, volume reduction/energy recovery, and similar diversion actions. The DoD has set a target C&D debris diversion rate of 60 percent by fiscal year 15 (DoD 2012). Application of the DoD diversion rate would result in approximately 28,738 tons of potential C&D debris being diverted for reuse or recycling and approximately 19,159 tons of debris being placed in landfills. This would be a potentially short-term, minor, adverse impact that the landfill could absorb, as the Berger Inert Landfill is at 55 percent capacity with 15 more years of operation. The landfill has a 10-acre plot for future expansion (Han 2013).

Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, LBP, or other hazardous components, would be managed in accordance with AFI 32-7042, "Waste Management."

4.3.8.7 Transportation

Implementation of the proposed KC-46A MOB 1 scenario at Grand Forks AFB would require the delivery of materials to and removal of construction-related debris from demolition, renovation, and new construction sites. Trucks associated with these activities would access the base via the Commercial Gate. The North Dakota Department of Transportation stated in a scoping letter that the agency would require the use of the gate on the U.S. Highway 2 interchange for all traffic.

Construction crews would access the base via the Main Gate or the Commercial Gate. Construction-related traffic would minimally add to the total existing traffic volume in the area and on base. Increased traffic associated with these activities could contribute to increased congestion at the entry gates, delays in the processing of access passes, and degradation of the affected road surfaces. Additionally, intermittent traffic delays and temporary road closures could result in the immediate vicinity of the base and infrastructure project sites. Potential congestion impacts could be avoided or minimized by scheduling truck deliveries outside of the peak inbound traffic time and by having construction workers use the Commercial Gate instead of the Main Gate. Also, many of the heavy construction vehicles would be driven to the site and kept on base for the duration of the C&D activities, resulting in relatively few additional trips. Traffic delays would be temporary in nature, ending once construction activities are complete. As a result, no long-term impacts to on- or off-base transportation infrastructure are anticipated.

The proposed KC-46A MOB 1 scenario at Grand Forks AFB would result in an approximate 70 percent increase in daily commuting traffic. To evaluate the greatest impact to transportation infrastructure, this assessment assumes that all personnel and dependents would live off base, work standard workdays, and drive individually to the base. This increase in base mission personnel could increase congestion and queuing at the Main Gate and Commercial Gate during morning and evening rush hours. To minimize the potential for adverse impacts, the base could adjust the schedule of operations to accommodate this increase, upgrade the entry gates (e.g., provide additional lanes), and/or provide additional personnel at the gates to process security checks during the peak hours. Regional access roads and the on-base road network have adequate capacity to absorb the minor amount of additional traffic without major impacts on traffic flow, circulation, or level of service.

4.3.9 Hazardous Materials and Waste

4.3.9.1 Hazardous Materials Management

Section 4.1.9.1 describes the hazardous materials management specific to the KC-46A aircraft. No new hazardous materials would be added that exceed current hazardous waste processes at Grand Forks AFB. Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through HAZMART are adequate to handle the changes anticipated with the addition of the KC-46A MOB 1 scenario, but would be expanded to meet the increased use. The hazardous materials contract would be reviewed to ensure the contractor is able to fully support the addition of the KC-46A MOB 1 mission.

4.3.9.1.1 Aboveground and Underground Storage Tanks

The addition of 36 KC-46A aircraft at Grand Forks AFB is expected to increase the maximum daily consumption of JP-8. The increase in fuel consumption would be supported by the current infrastructure and proposed improvements to the hydrant system at the base. Some of the new and remodeled facilities would require the addition of new ASTs, USTs, and hazardous materials and hazardous waste containers. The new and remodeled facilities would be constructed with berms and drains leading to OWSs, if required, to contain releases of petroleum products. The Grand Forks AFB Spill Prevention Control and Countermeasures (SPCC) Plan would subsequently need to be amended to capture any changes in facility design, construction operation, or maintenance that materially affect the potential for a discharge (Grand Forks AFB 2009a).

4.3.9.1.2 Toxic Substances

Several demolition and renovation projects are planned as part of the proposed KC-46A MOB 1 scenario at Grand Forks AFB. Any renovation, construction, or demolition proposed at Grand Forks AFB would be reviewed to determine if ACM is present. Volume II, Appendix E, Table E-4, contains a list of buildings proposed for modification and their potential to contain ACMs. Additional testing would be conducted where no data exist. All testing and data collection would be conducted in accordance with the Asbestos Management Plan (Grand Forks AFB 2005). Any exposed friable asbestos would be removed in accordance with USAF policy and applicable health laws, regulations, and standards. A Notification of Demolition and Renovation (Form 17987) would be submitted to the North Dakota Department of Health (NDDH) at least 10 days prior to initiating activities, whether or not asbestos is present (NDDH 2013b). Additionally, the handling and disposal of wastes would be in compliance with Federal and state regulations.

All renovation, construction, or demolition projects proposed at Grand Forks AFB would be reviewed to determine if LBP is present and if it would be disturbed in the performance of the work. Volume II, Appendix E, Table E-4, contains a list of the buildings that would be affected by demolition, renovation, or alteration, their years of construction, and their potential for LBP to be present. In accordance with the Lead-Based Paint Management Plan (Grand Forks AFB 2003), any required renovation activities such as sanding, scraping, or other disturbances of the paint that could generate lead dust would not be performed without prior LBP testing. Buildings being demolished typically do not require LBP abatement unless the LBP would be disturbed by sanding, scraping, dry-cutting, or torching. During the proposed renovations, if paint removal abatement actions are deemed necessary, the base would ensure that adequate precautions are taken during all renovation and demolition activities that disturb LBP. Additionally, all handling and disposal of wastes would be in compliance with Federal and state regulations.

Regarding PCBs, none of the transformers at Grand Forks AFB have PCB-containing oil (Grand Forks AFB 2009a).

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the KC-46A MOB 1 scenario at Grand Forks AFB, and long-term benefits from removal of toxic substances are anticipated.

4.3.9.2 Hazardous Waste Management

Section 4.1.9.4 describes the hazardous waste management specific to the KC-46A aircraft. Grand Forks AFB would generate more hazardous wastes during various operations and

maintenance activities associated with the addition of the 36 KC-46A aircraft associated with the KC-46A MOB 1 scenario. Waste generated by the proposed MOB 1 scenario would be consistent with waste formerly generated by the KC-135. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. However, no new hazardous materials would be added that exceed current base hazardous waste processes. The Grand Forks AFB HWMP (Grand Forks AFB 2012c) would be updated to reflect any change in generator status, disposal procedures, and any changes of hazardous waste generators and waste accumulation point monitors. Although no adverse impacts are anticipated to result from the increased volumes, this increase could potentially change Grand Forks AFB from a small-quantity generator (SQG) to an LQG. Grand Forks AFB formerly operated as an LQG prior to the departure of the KC-135 mission.

Waste generators are required to monitor their waste-generating activities and to notify the NDDH if they exceed their generator status. NDDH may not require an SQG to begin operating as an LQG for a one-time exceedance of its generator threshold. However, if Grand Forks AFB anticipates exceeding or frequently exceeds its SQG status, the base would be required to notify the NDDH that it is operating as an LQG, and compliance with the Federal and state regulatory requirements for an LQG would be required. NDDH characterizes an LQG as producing 2,200 pounds (1,000 kilograms) or more per month. The *North Dakota Hazardous Waste Compliance Guide* outlines and describes the state regulations (USEPA-delegated authority) (NDDH 2012b).

4.3.9.3 Environmental Restoration Program

The USAF would coordinate with the restoration office before any construction, renovation, demolition, or modifications are initiated. Although formal construction waivers are not required, the USAF does require reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current EIAP processes as specified in AFI 32-7061. The USAF will ensure that these projects are coordinated with ongoing remediation or investigation activities at any ERP site. However, if existing plans and procedures are followed, there would be no anticipated impacts on these ERP sites. During C&D activities, there is the potential to encounter contaminated soil and groundwater in areas associated with ERP sites. There is also the possibility that undocumented contaminated soils from historical fuel spills may be present. If encountered, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable Federal, State, and local regulations; AFIs; and base policies. If soil or groundwater contaminants are encountered during C&D activities, health and safety precautions, including worker awareness training, may be required.

With regard to the ERP sites, the KC-46A MOB 1 scenario at Grand Forks AFB includes the renovation of parking apron/fuel hydrant upgrades and the new construction of a taxiway and parking apron where ERP Site ST008 is located. A groundwater plume with benzene contamination is located in this area and is currently being monitored in the remedial action operation phase with land use controls in place. Groundwater in the area is typically at approximately 3 to 5 feet bgs and may be encountered during C&D. The projects associated with the KC-46A MOB 1 scenario at Grand Forks AFB would require the modification or the abandonment and replacement of five groundwater monitoring wells (MW01, MW02, MW03, MW04, and MW05) associated with Site ST008.

4.3.10 Socioeconomics

4.3.10.1 Population

The current personnel at Grand Forks AFB and the projected change anticipated to support the KC-46A MOB 1 scenario are provided in Table 2-13. Implementation of the MOB 1 scenario would potentially add up to 4,526 people to Grand Forks County, resulting in an approximate 6.8 percent increase in the county population. This potential increase is based on the assumption that the 3 DoD civilians, 659 part-time Guardsmen, and 20 contractors would be from Grand Forks County.

4.3.10.2 Economic Activity (Employment and Earnings)

As shown in Table 2-13, the MOB 1 scenario at Grand Forks AFB would increase the work force assigned to Grand Forks AFB by 1,747 total personnel. The personnel would comprise 1,724 full-time military, 3 DoD civilians, and 20 contractors. The addition of 1,747 personnel at Grand Forks AFB would increase on-base jobs from 2,513 to 4,260, or an approximate 69 percent increase. The IMPLAN model calculates that approximately 908 indirect and induced jobs in the ROI would result from implementation of the KC-46A MOB 1 scenario, with most of the jobs being created in industries such as food services, private hospitals, offices of health practitioners, and retail stores. With a 2012 unemployment rate of 3.7 percent, it is expected that the local labor force would be sufficient to fill these new jobs without a migration of workers into the area.

Construction activities, in general, provide economic benefits to the surrounding areas through the employment of construction workers, as well as the purchase of materials and equipment. These construction activities would be temporary and would only provide a limited amount of economic benefit. For every $100 million spent on construction of other new nonresidential structures in the ROI, an estimated 1,254 direct, indirect, and induced jobs would be created (MIG 2012). The USAF estimates that approximately $345 million in construction expenditures would be associated with the MOB 1 scenario at Grand Forks AFB. This amount could generate approximately 4,326 jobs primarily within the construction industry or related industries, including architecture, food services, private hospitals, and retail stores (MIG 2012). Since the construction activities are scheduled over several years and it would be possible for a single worker to work on multiple projects, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs. The indirect and induced income associated with construction expenditures is estimated to be approximately $51 million. These jobs, and the related income, would be temporary during the construction activity.

4.3.10.3 Housing

Under the assumptions that only DoD civilians, part-time Guardsmen, and contractors would be from the local population (as stated in Section 4.3.10.1) and that all incoming full-time military personnel would require off-base housing, there would be a potential need for 1,724 off-base housing units to support the full-time military personnel and any military dependents and family members. Under these assumptions and based on the number of vacant homes described in Section 3.3.10.1.3, the housing market in the ROI would be anticipated to support this need. However, prior to implementing the MOB 1 scenario, an HRMA would be required to determine the number of suitable and available housing units within the HRMA-defined market area (20 miles or one-hour commute drive from the base gate, whichever is shorter).

4.3.10.4 Education

As shown in Table 2-13, the overall change in the number of military dependents and family members accompanying the additional USAF personnel associated with the KC-46A MOB 1 scenario would be approximately 2,802 people. The total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time military personnel only. The total number of children was estimated at 1.5 times 65 percent of full-time military personnel, since it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 1,681 military dependents would be anticipated to be of school age. Therefore, approximately 1,681 students would be anticipated to enter any of the nine public school districts in Grand Forks County. The students entering the local schools would be of varying ages and would be expected to live in different parts of Grand Forks County. Based on the number of school districts and schools in the county, as well as current class sizes, the schools in Grand Forks County would have the capacity to support the incoming students. However, space availability for new enrollments depends on the timing of the relocation and which schools the students would attend. A large influx of students over a short period could result in capacity constraints and could require additional personnel.

4.3.10.5 Public Services

Grand Forks County represents a large community with police, fire, and other services. The addition of approximately 4,526 military personnel and dependents would represent a 6.8 percent increase of the existing population in Grand Forks County. The increase in the county population would slightly impact police, fire, or other services and could require additional manpower to support the incoming population.

4.3.10.6 Base Services

The base services at Grand Forks AFB have adequate capacity in the CDC, fitness, and dining facilities to support implementation of the proposed MOB 1 scenario.

4.3.11 Environmental Justice and the Protection of Children

Analysis of the MOB 1 scenario noise contours relative to the baseline contours at Grand Forks AFB indicates that off-base populations of minorities, low-income persons, and children would not be exposed to noise levels above what is occurring under the baseline conditions (see Table 4-21). Therefore, implementation of the MOB 1 scenario at Grand Forks AFB is not anticipated to result in disproportionate impacts on these off-base populations.

Table 4-21. Percentage of Off-Base Population Potentially Exposed to Noise Levels of 65 dB DNL or Greater for Grand Forks AFB

Scenario	Percentage Minority		Percentage Low-Income		Percentage Children (Under 18)	
	65–69 dB DNL	70–74 dB DNL	65–69 dB DNL	70–74 dB DNL	65–69 dB DNL	70–74 dB DNL
MOB 1	0%	0%	0%	0%	0%	0%
Baseline (Existing Conditions)	0%	0%	0%	0%	0%	0%
Region of Comparison	11%		17%		20%	

4.4 McCONNELL AIR FORCE BASE (FTU OR MOB 1)

This section of Chapter 4 presents the operational and environmental factors specific to McConnell AFB. Sections 2.4.4.2 and 2.4.4.3, respectively, describe the facilities and infrastructure, personnel, and flight operations requirements of the FTU and MOB 1 scenarios and the specific actions at McConnell AFB that would be required to implement each scenario.

As described in Section 4.5, the No Action Alternative would mean that neither the KC-46A FTU nor the KC-46A MOB 1 scenario would be implemented at McConnell AFB at this time. In addition to no facility or personnel changes, there would be no change in based aircraft at McConnell AFB; operations at McConnell AFB would continue as described for baseline conditions. The 22 ARW would continue to fly the aerial refueling mission with a PAA of 44 KC-135 aircraft and the personnel described under baseline conditions.

4.4.1 Noise

4.4.1.1 FTU Scenario Noise Consequences

4.4.1.1.1 Base Vicinity

KC-46A aircraft are slightly quieter than the KC-135 aircraft currently based at McConnell AFB (see Table 4-22). The difference between a KC-135 and a KC-46A aircraft during landing would be noticeable, but takeoff noise levels for the two aircraft would be difficult to distinguish. Aircraft flying at higher overflight distances may not have flaps and gear deployed as they would when in landing or takeoff configurations, resulting in slightly lower noise levels than shown in Table 4-22.

Table 4-22. Aircraft Noise Level Comparison at McConnell AFB

Aircraft	Power Setting	Sound Exposure Level at Overflight Distance (in decibels)					
		250 feet	500 feet	1,000 feet	2,000 feet	5,000 feet	10,000 feet
Landing							
KC-46A	60% N1	96	91	85	79	70	61
KC-135	65% NF	100	95	90	84	75	67
Takeoff							
KC-46A	92% N1	107	102	96	88	78	69
KC-135	90% NF	105	100	95	90	81	73

Key: Power Units: N1 – engine speed at Location No. 1; NF – engine fan revolutions per minute
Source: NOISEMAP 7.2 Maximum Omega 10 Results.

KC-46A aircrews would use the same flying procedures (e.g., ground tracks, altitude profiles) currently used by KC-135 aircrews. Aircrews associated with the KC-46A FTU scenario would frequently practice tactical procedures in which the aircraft climbs or descends in the immediate vicinity of the airfield. Tactical training prepares aircrews for operations in forward operating locations in which flying at low-altitudes over land not controlled by friendly forces exposes the aircraft to ground-based threats. Relative to a standard takeoff or landing, a tactical landing concentrates low-altitude flying and noise near the airfield. It is estimated that about 90 percent of KC-46A FTU training sortie takeoffs and 80 percent of training sortie landings would be conducted using tactical procedures.

Per the FTU scenario, the KC-46A would be operated on non-holiday weekdays for a total of 240 operational days per year, approximately mirroring the operational patterns of current

KC-135 operations. On an average busy flying day, aircrews would fly 7.5 sorties, and each sortie would include about 10 closed patterns (i.e., approaches to airfield followed by maneuver for another approach). The FTU scenario would add an additional 41,364 airfield operations per year, more than doubling the total number of operations at the airfield.

Night training would be regularly conducted by KC-46A aircrews. Approximately 20 percent of KC-46A operations would be conducted between 10:00 P.M. and 7:00 A.M. Currently, 26-percent of total operations at McConnell AFB are conducted at night.

Noise levels near McConnell AFB were calculated using NOISEMAP (Version 7.2) and include the location-specific effects of terrain and ground impedance. Details of the methods used to calculate noise levels and the population affected by elevated noise can be found in Volume II, Appendix B, Section B.1.3. Annoyance is a subjective response that is often triggered by interference of noise with activities. Individuals engaged in activities more easily disrupted by noise (e.g., conversation, sleeping, or watching television) are more likely to become annoyed than others. Although the reaction of an individual to noise depends on a wide variety of factors, social surveys have found a correlation between the time-averaged noise level as measured in DNL and the percentage of the affected population that is highly annoyed (see Volume II, Appendix C, Section C.1.3.1). It is widely accepted that 65 dB DNL is the noise level at which a substantial percentage of the population can be expected to be annoyed by noise, and this has been adopted by the USAF and several other Federal agencies as the level above which noise-sensitive land uses are not considered compatible (see Section 3.4.7 and Volume II, Appendix C, Section C.1.3.2).

Figure 4-5 depicts the noise contours associated with implementation of the KC-46A FTU scenario at McConnell AFB. The process used to calculate noise levels is described in more detail in Volume II, Appendix B, Section B.1.3. Noise levels are displayed graphically as DNL contours in 5 dB increments ranging from 65 dB to 85 dB. The number of off-base acres affected by noise levels greater than 65 dB DNL would increase from 724 to 997 acres (see Table 4-23). The estimated number of residents affected by this same level of noise would increase by 594 from 214 to 808 residents.

Table 4-23. KC-46A FTU and MOB 1 Scenario Noise Impacts Relative to Baseline Noise at McConnell AFB

Noise Level (dB DNL)	Baseline Conditions			FTU Scenario			MOB 1 Scenario		
	Off-Base Population	Off-Base Acres	On-Base Acres	Off-Base Population	Off-Base Acres	On-Base Acres	Off-Base Population	Off-Base Acres	On-Base Acres
65–69	213	650	438	805	834	442	15	333	435
70–74	1	74	418	3	163	384	0	5	337
75–79	0	0	455	0	0	463	0	0	503
80–84	0	0	198	0	0	315	0	0	173
≥85	0	0	128	0	0	129	0	0	112
Total	**214**	**724**	**1,637**	**808**	**997**	**1,733**	**15**	**338**	**1,560**

Implementation of the KC-46A FTU scenario at McConnell AFB would not expose off-base areas to noise levels greater than 80 dB DNL. A total of 444 on-base acres located along the flightline would be affected by noise levels greater than 80 dB DNL. The number of structures on McConnell AFB exposed to noise levels greater than 80 dB DNL would increase from 46 to 48. None of the structures are occupied for residential purposes. Hearing loss risk among people working in high-noise environments on McConnell AFB would continue to be assessed and managed in accordance with DoD, OSHA, and NIOSH regulations regarding occupational noise exposure.

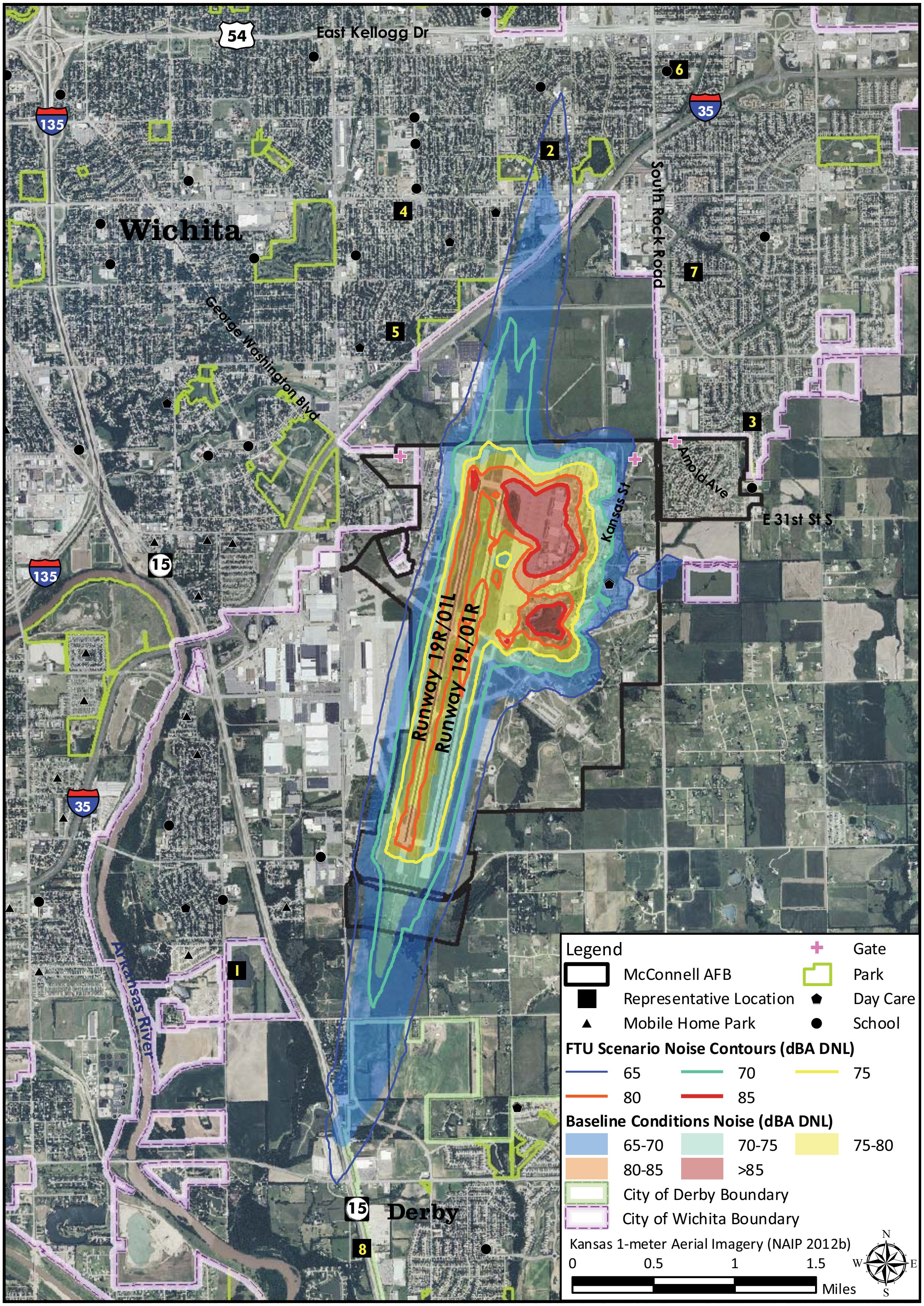

Figure 4-5. KC-46A FTU Scenario and Baseline Noise Contours at McConnell AFB

Table 4-24 presents noise conditions at several representative locations in the area surrounding McConnell AFB. These points, which are shown on Figure 4-5, do not denote a specific noise-sensitive receptor, but were instead established based on geographic center points of U.S. Census subdivisions. Noise levels at the representative locations under baseline conditions and the FTU and MOB 1 scenarios are listed in Table 4-24. The DNL at the 8 locations studied would increase between 1 and 2 dB under the FTU scenario. Increases in time-averaged noise levels near the base would be a result of increases in operations tempo instead of the aircraft being louder. For each location, a range of SELs is provided for the loudest five overflight types experienced at that location. Departures and closed patterns of transient aircraft (e.g., F-16C, T-38C) generate the highest SELs at the locations studied. A few KC-135 closed pattern operations and KC-46A departure and closed pattern operations were also part of the top five SEL noise contributors under the FTU scenario. Note that ground tracks and aircraft configuration vary from flight to flight based on winds and other factors, so flight procedures could be louder or quieter than the SEL values listed in this table. A more detailed description of the major noise-contributing operations at McConnell AFB can be found in Table C-1-4 in Volume II, Appendix C, Attachment C-1.

Table 4-24. KC-46A FTU and MOB 1 Scenario Noise Levels at Representative Locations Near McConnell AFB

Location ID	Baseline		FTU Scenario		MOB 1 Scenario	
	DNL (dB)	Top 5 SELs (dB)[a]	DNL (dB)	Top 5 SELs (dB)[a]	DNL (dB)	Top 5 SELs (dB)[a]
1	52	83–94	53	83–94	50	83–94
2	65	95–108	66	95–108	60	93–108
3	54	82–95	55	86–95	53	83–95
4	52	81–95	53	81–95	50	81–95
5	55	85–96	56	85–96	53	85–96
6	53	85–98	55	85–98	50	83–98
7	52	82–101	54	84–101	50	83–101
8	61	91–102	62	91–102	57	91–102

[a] 'Top 5 SELs' refers to the range of loudest five event types experienced at the location (see Attachment C-1).

C&D activities in support of the proposed beddown would be conducted in the context of an active AFB where aircraft and other types of noise are a normal part of the environment. Although equipment would be muffled, construction activities unavoidably generate localized increases in noise qualitatively different from aircraft noise. For example, a typical backhoe, dozer, and crane generate up to approximately 78, 82, and 81 dB, respectively, at a distance of 50 feet (FHWA 2006). Construction noise would be minimized in accordance with local regulations and would be temporary and intermittent, lasting only the duration of the project. Furthermore, construction activities would be expected to take place during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Some people living or working near the construction sites may notice and be annoyed by the noise, but noise impacts would not be substantial enough to be considered significant.

4.4.1.1.2 Auxiliary Airfields

As part of the FTU scenario, aircrews operating the KC-46A would use three auxiliary airfields that are currently being used by KC-135 aircrews to provide variable training experiences. KC-46A aircraft would make use of established flying procedures while conducting operations at auxiliary airfields. These auxiliary airfields are described below. Auxiliary airfield operations would not be conducted after 10:00 P.M. or before 7:00 A.M.

Clinton-Sherman Industrial Airpark (CSM), OK. An estimated 977 KC-46A annual airfield operations would be conducted at CSM under the FTU scenario. The operations would take place in the context of 28,485 current annual airfield operations. A large percentage of ongoing operations at CSM are military aircraft that are as loud as or louder than the KC-46A. Based on the relatively low number of KC-46A operations proposed as part of the FTU scenario, noise levels near CSM would be expected to increase by less than 0.5 dB DNL (see Volume II, Appendix B, Section B.1.3.2, for supporting information). KC-46A aircrews would follow procedures used by other aircraft operating at CSM currently including avoidance of overflights of the town of Burns Flat. No substantive noise impacts would be expected to occur as a result of proposed KC-46A practice landings at CSM.

Forbes Field (FOE), KS. Approximately the same number of KC-46A auxiliary airfield operations conducted at CSM would also be conducted at Forbes Field. The 977 annual KC-46A airfield operations would be conducted in addition to the 24,742 current annual airfield operations. As was the case at CSM, a large percentage of operations at FOE are military aircraft that are as loud as or louder than the KC-46A. An ANG KC-135 unit is based at FOE. Based on the relatively low proposed number of KC-46A operations in the context of a large number of operations as loud or louder, noise levels near FOE would be expected to increase by less than 0.5 dB DNL (see Volume II, Appendix B, Section B.1.3.2, for supporting information). No substantive noise impacts would be expected to occur as a result of proposed KC-46A practice landings at FOE.

Wichita Mid-Continent Airport (ICT), KS. Wichita Mid-Continent Airport is expected to be used more frequently than the other two regularly used auxiliary airfields combined. KC-135 aircrews currently complete 35 or more operations per month at ICT. However, the 4,561 proposed KC-46A operations would occur in the context of 165,035 airfield operations being conducted annually under baseline conditions. Frequent users of ICT under baseline conditions include commercial and military aircraft types that are as loud as or louder than the KC-46A. In the context of ongoing operations, proposed KC-46A practice landings would be expected to increase noise levels by 0.5 dB DNL or less. No substantive noise impacts would be expected to occur as a result of proposed KC-46A practice landings at ICT.

4.4.1.2 MOB 1 Scenario Noise Consequences

KC-46A aircrews associated with the MOB 1 scenario would use the same flight procedures currently used by the KC-135 aircrews based at McConnell AFB. Tactical operations would make up 25 percent of takeoff and 40 percent of initial landing operations. Tactical operations, which involve operating at high altitudes except in the immediate vicinity of the airfield, generate less noise than standard operations at locations that are not immediately adjacent to the airfield. KC-46A aircrews associated with the MOB 1 scenario would fly approximately 33,710 operations per year versus the 24,521 annual operations currently being flown by the KC-135. The KC-46A would eventually replace the KC-135 aircraft, resulting in 47,807 projected annual airfield operations.

As part of the Reserve associate unit operations, the KC-46A would be flown on some weekend days. MOB 1 scenario training flights would be conducted 312 days per year. However, mission sorties, in which the aircraft is supporting real-world operations, could take place on any day of the year. Aircraft based at McConnell AFB are currently operated mostly on non-holiday weekdays, but training sorties do occur on weekends on an occasional basis. KC-46A aircrews would conduct about 10 percent of total airfield operations between 10:00 P.M. and 7:00 A.M.

Figure 4-6 depicts the noise contours associated with implementation of the KC-46A MOB 1 scenario at McConnell AFB. Noise contours in this figure include geographically isolated areas in

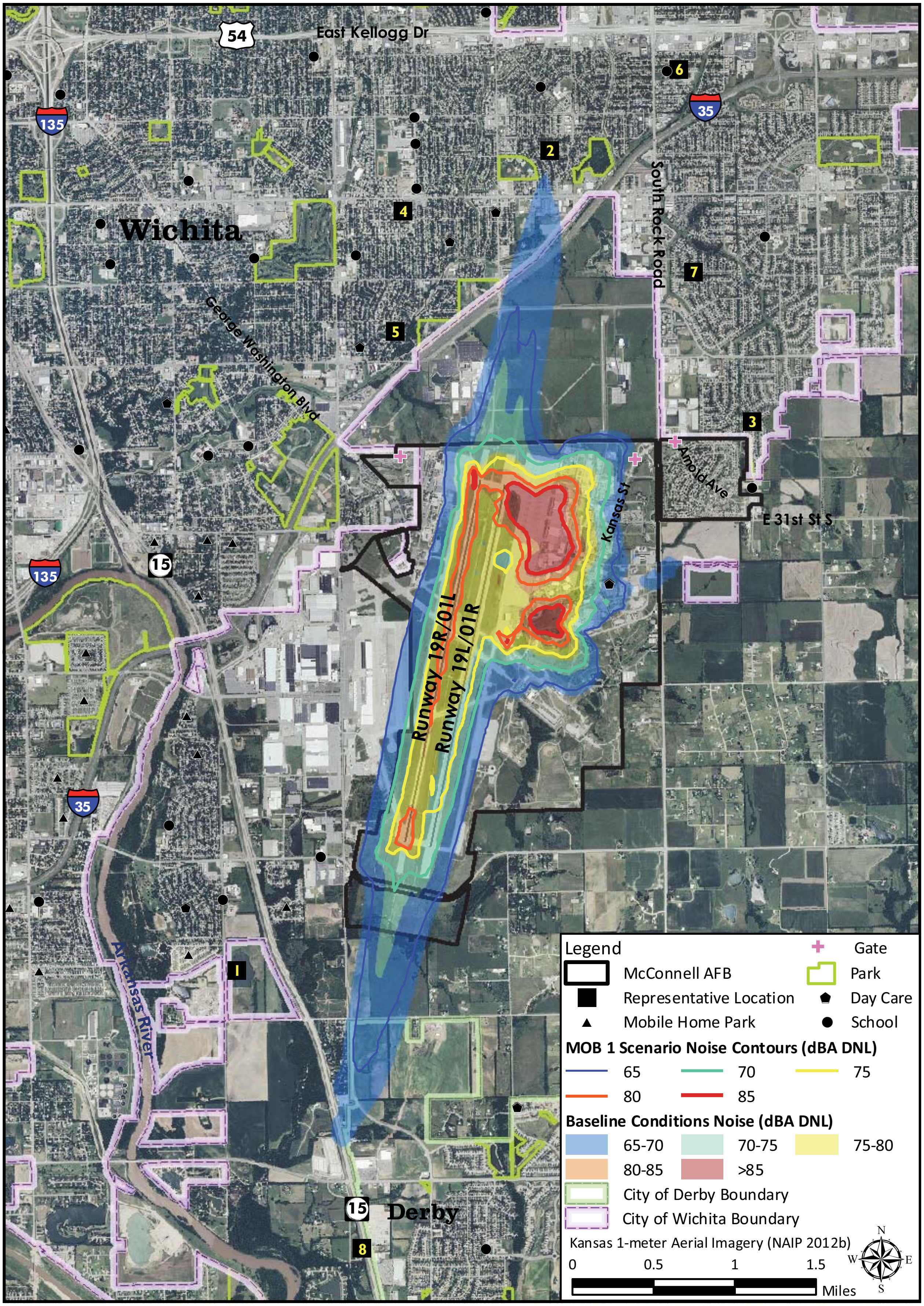

Figure 4-6. KC-46A MOB 1 Scenario and Baseline Noise Contours at McConnell AFB

which the noise level exceeds 65 dB DNL. In this case, the noise contour islands result from a crossing of representative flight paths used in the noise model. The total number of acres (on- and off-base) and the number of off-base residents affected by noise levels greater than 65 dB DNL would decrease under the MOB 1 scenario (see Table 4-23). Reduction in noise levels can be generally attributed to the replacement of the KC-135 with the slightly quieter KC-46A aircraft.

As described in Section 2.3.3, IOT&E operations would be conducted at the MOB 1 location. IOT&E operations would be expected to be indistinguishable to members of the public from standard MOB 1 flying operations and would taper off before the MOB 1 reaches full operations tempo such that annual operations listed counts for MOB 1 would not be exceeded.

Implementation of the KC-46A MOB 1 scenario at McConnell AFB would not expose off-base areas to noise levels greater than 80 dB DNL. On base, the number of acres affected by this same noise level would decrease from 326 to 285 acres. The area affected would be different from under baseline conditions, and the number of structures affected would decrease from 46 to 40. Hearing loss risk among people working in high-noise environments on McConnell AFB would continue to be assessed and managed in accordance with DoD, OSHA, and NIOSH regulations regarding occupational noise exposure.

Additional noise analysis was conducted at eight representative locations near McConnell AFB. The representative locations, which are depicted on Figure 4-6, were established based on central points of U.S. Census subdivisions and do not denote specific noise-sensitive locations. DNL values and the SEL generated by the loudest five types of overflights at these locations are listed in Table 4-24 for baseline conditions and the MOB 1 scenario. Changes in DNL would range from a decrease of 1 to 5 dB. The range of top five loudest event types would increase in some areas and decrease in others. Table C-1-4 in Volume II, Appendix C, Attachment C-1, provides details regarding the operations types generating the highest SELs at the locations studied.

C&D noise under the MOB 1 scenario would produce similar or higher impacts compared to the FTU scenario, as this scenario would require a larger amount of C&D activity. Due to the temporary and intermittent nature of C&D and its associated noise level, noise impacts would not be substantial enough to be considered significant.

4.4.2 Air Quality

The air quality analysis estimated the impact of emissions that would occur from proposed KC-46A construction and operational activities at McConnell AFB resulting from implementation of the FTU or MOB 1 scenarios. Volume II, Appendix D, Section D.4.1, of this Final EIS includes estimations of criteria pollutant emissions, HAPs, and GHGs from proposed sources at McConnell AFB.

The regions surrounding McConnell AFB and the auxiliary airfields proposed for use in the FTU and MOB 1 scenarios attain all of the NAAQS. Therefore, the analysis used the PSD threshold of 250 tons per year of a pollutant as an indicator of significance of projected air quality impacts within these regions.

Construction – The KC-46A scenarios proposed for McConnell AFB would require construction and/or renovation of airfield facilities, including training facilities, hangars, taxiways, and maintenance and fueling facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions resulting from the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of equipment on exposed soil. Construction activity data were developed to estimate proposed construction equipment usages and associated combustive and fugitive dust emissions for each project alternative.

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollutant Emission Factors*, AP-42, Volume I (USEPA 1995); the USEPA NONROAD2008a model for nonroad construction equipment (USEPA 2009a); and the USEPA MOVES2010b model for on-road vehicles (USEPA 2013b).

Inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Section 4.1.2 identifies these standard construction practices that would control fugitive dust.

Operations – Emissions associated with operation of the proposed FTU and MOB 1 scenarios at McConnell AFB would include (1) operations and engine maintenance/testing of aircraft, (2) onsite POVs and GMVs, (3) offsite POV commutes, (4) AGE, (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and other sources. Operational data used to calculate the projected KC-46A aircraft emissions were obtained from data used in the project noise analyses (see Section 4.4.1). Factors used to calculate combustive emissions for the KC-46A aircraft were based on emissions data developed by Pratt and Whitney for the PW4062 engine (ICAO 2013b). The operational times in mode for the KC-46A engine were based on those currently used for the KC-135 aircraft (Air Force Civil Engineer Center 2013).

Emissions from non-aircraft sources resulting from the proposed FTU and MOB 1 scenarios were estimated by multiplying existing emissions for these sources at McConnell AFB by the ratio of total employment populations associated with each proposed scenario and baseline conditions at McConnell AFB. The air quality analysis used CY 2012 to define existing emissions, as it included the most recent calendar year of operational activities at McConnell AFB (see Table 3-32). For comparative purposes, emissions resulting from proposed AGE supporting the KC-46A were based on AGE usages for existing KC-135 aircraft at McConnell AFB.

The analysis of proposed aircraft operations is limited to operations that occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

4.4.2.1 FTU Scenario Air Quality Consequences

Table 4-25 presents estimates of emissions from construction activities that would result from implementation of the FTU scenario at McConnell AFB. These data show that, for each year of construction, total emissions would fall well below the PSD thresholds used to indicate significance or insignificance. Therefore, temporary construction emissions resulting from implementation of the FTU scenario would produce less than significant air quality impacts. The main sources of PM_{10}/$PM_{2.5}$ emissions would be fugitive dust from the proposed operation of equipment on unpaved surfaces.

The air quality impact analysis of the FTU scenario at McConnell AFB is based on the net increase in emissions associated with the beddown of eight KC-46A aircraft. To produce a conservative analysis, it was assumed that all KC-46A aircraft associated with the FTU scenario would become operational at McConnell AFB in CY 2016.

Table 4-25. Annual Construction Emissions Under the FTU Scenario at McConnell AFB

Year/Construction Activity	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
CY 2014							
Demolish All Buildings	0.01	0.07	0.14	0.00	0.10	0.02	21
Total Building Development	0.93	4.83	10.09	0.28	6.06	1.36	1,361
Apron Fuels Hydrant Upgrade	0.03	0.14	0.29	0.01	0.18	0.04	39
Airfield/Runway Taxiway D/F Repairs	0.03	0.71	0.17	0.00	0.22	0.04	29
Total CY 2014	**1.00**	**5.75**	**10.69**	**0.29**	**6.56**	**1.45**	**1,451**
CY 2016							
Alpha Ramp Deicing Pad Expansions and Supporting Infrastructure	0.04	0.21	0.40	0.01	0.57	0.09	106
Total CY 2016	**0.04**	**0.21**	**0.40**	**0.01**	**0.57**	**0.09**	**106**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

Table 4-26 summarizes the annual emissions that would result from KC-46A FTU operations at McConnell AFB. These data show that the increase in emissions from the addition of eight KC-46A aircraft at McConnell AFB would not exceed 250 tons per year for VOCs, CO, SO_x, PM_{10}, or $PM_{2.5}$. Therefore, the FTU scenario would produce less than significant impacts to these pollutant levels. However, these data also show that the increase in NO_x emissions from the proposed FTU scenario would exceed 250 tons per year. KC-46A aircraft operations and on-wing engine testing activities are the primary contributors to these emission increases.

Emissions of NO_x that would result from implementation of the FTU scenario within Sedgwick County were compared to the most recent Sedgwick County emissions inventory (CY 2008) to determine the relative magnitude of proposed emissions and, therefore, their potential to combine with baseline emissions and contribute to an exceedance of an ambient air quality standard. The NO_x emission increases that would result from implementation of the FTU scenario would amount to about 5 percent of the total NO_x emissions generated by Sedgwick County in 2008 (see Table 3-31). The majority of emissions generated by the FTU scenario would occur from KC-46A aircraft operations up to an altitude of 3,000 feet AGL and across the several square miles that make up the McConnell AFB airspace and adjoining aircraft flight patterns. These emissions would be adequately mixed through this volume of atmosphere to the point that they would not result in substantial ground-level air quality impacts in any localized area. Given that the county attains the NO_2 NAAQS by a wide margin, these NO_x emission increases would likely not have the potential to contribute to an exceedance of the NO_2 NAAQS.

As mentioned in section 3.4.2, air quality monitoring stations in the project region have recently recorded maximum O_3 levels that are slightly higher than the value of the national standard. The above analysis demonstrates that emissions from the proposed KC-46A aircraft operations would be diluted over a large volume of atmosphere across the McConnell AFB project region. These factors would dilute the impact of proposed NO_x emissions within any localized area and to ambient O_3 levels. However, the increase in NO_x emissions generated from operation of the FTU scenario would amount to approximately 5 percent annual increase and potentially a 4 ton per day,

or more, increase in NO_x emitted within Sedgwick County as a whole. These NO_x emissions would occur in an area that is in jeopardy of not continuing to attain the NAAQS for O_3. Therefore, the increase in NO_x (and VOC) emissions resulting from implementation of the FTU scenario, in combination with all other sources of those precursor emissions in Sedgwick County on a given day, could be substantial enough to contribute to an exceedance of the O_3 NAAQS in the region.

Table 4-26. Annual Operations Emissions Under the FTU Scenario at McConnell AFB, CY 2016

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-46A Aircraft Operations	34.63	157.55	1,034.50	54.09	3.35	2.84	150,110
On-Wing Aircraft Engine Testing – KC-46A	14.14	48.41	23.62	1.88	0.17	0.15	5,226
Aerospace Ground Support Equipment – KC-46A	0.38	2.73	3.11	0.12	0.46	0.42	557
KC-135 Aircraft Operations	10.89	176.49	291.09	27.06	1.47	1.47	75,389
Transient Aircraft Operations	11.89	52.46	97.63	8.46	6.72	6.72	20,676
On-Wing Aircraft Engine Testing – KC-135	2.03	27.92	44.75	3.56	0.19	0.19	9,907
AGE – Existing Aircraft	1.17	8.41	9.56	0.37	1.41	1.29	1,710
GMVs/Nonroad Equipment	1.45	6.78	16.44	0.61	1.63	1.21	3,033
Privately Owned Vehicles – On Base	0.13	7.13	0.94	0.02	0.08	0.04	1,246
Privately Owned Vehicles – Off Base	0.74	34.60	6.10	0.10	0.73	0.37	6,406
Mobile Fuel Transfer Operations	0.13	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	[a]	9.08	13.62	0.31	[a]	[a]	[a]
Total McConnell AFB Emissions – FTU Scenario	**77.60**	**531.55**	**1,541.37**	**96.55**	**16.21**	**14.71**	**274,529**
Existing McConnell AFB Emissions	**40.79**	**335.90**	**493.25**	**40.43**	**12.89**	**11.63**	**117,551**
McConnell AFB FTU Scenario Minus Existing Emissions	**36.81**	**195.65**	**1,048.11**	**56.12**	**3.32**	**3.08**	**156,708**
FTU Scenario Net Emissions Increase Fraction of Sedgwick County Emissions	**0.001**	**0.002**	**0.05**	**0.06**	**0.00001**	**0.0004**	**0.05**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

4.4.2.1.1 Auxiliary Airfields

Emissions from KC-46A FTU operations would occur within the immediate area of the auxiliary airfields and aircraft flight routes between these areas and McConnell AFB. Table 4-27 summarizes the annual emissions that would result from KC-46A operations proposed at each auxiliary airfield associated with the FTU scenario at McConnell AFB. These data show that the

increase in proposed emissions at CSM, FOE, and ICT would not exceed a PSD threshold. Therefore, KC-46A operations at each auxiliary airfield associated with the FTU scenario would produce less than significant air quality impacts.

Table 4-27. Annual Emissions from KC-46A FTU Operations at Auxiliary Airfields Near McConnell AFB, CY 2016

Auxiliary Airfield	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
Clinton Sherman Industrial Airpark (CSM)	0.12	1.45	25.97	1.32	0.08	0.07	3,671
Forbes Field (FOE)	0.12	1.45	25.97	1.32	0.08	0.07	3,671
Wichita Mid-Continent Airport (ICT)	0.54	6.76	121.25	6.15	0.36	0.30	17,138
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

4.4.2.2 MOB 1 Scenario Air Quality Consequences

Table 4-28 presents estimates of emissions from construction activities that would result from implementation of the MOB 1 scenario at McConnell AFB. These data show that, for each year of construction, total emissions would fall well below the PSD thresholds used to indicate significance or insignificance. Therefore, temporary construction emissions from the proposed MOB 1 scenario would produce less than significant air quality impacts. The main sources of PM_{10}/$PM_{2.5}$ emissions would be fugitive dust from the operation of equipment on unpaved surfaces.

Table 4-28. Annual Construction Emissions Under the MOB 1 Scenario at McConnell AFB

Year	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
CY 2014	1.31	6.87	14.12	0.39	8.56	1.91	1,915
CY 2015	0.97	5.52	10.33	0.29	3.46	1.16	1,485
CY 2016	0.05	0.28	0.55	0.02	0.60	0.10	129
CY 2017	0.00	0.06	0.01	0.00	0.00	0.00	2
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

The air quality impact analysis of the MOB 1 scenario at McConnell AFB is based on the net change in emissions that would result from the replacement of existing KC-135 operations with operations from the beddown of 36 KC-46A aircraft. To produce a conservative analysis, it was assumed that all 36 KC-46A aircraft associated with the MOB 1 scenario would become operational at McConnell AFB in CY 2016.

Table 4-29 summarizes the annual emissions that would result from implementation of the MOB 1 scenario at McConnell AFB. The data in Table 4-29 show that the net increase in emissions from the replacement of existing KC-135 aircraft operations with operations from 36 KC-46A aircraft would not exceed 250 tons per year for VOCs, CO, SO_x, PM_{10}, or $PM_{2.5}$. Therefore, implementation of the MOB 1 scenario would produce less than significant impacts on these pollutant levels. However, these data also show that the increase in NO_x emissions from the MOB 1 scenario would exceed 250 tons per year. KC-46A aircraft operations and on-wing

engine testing activities are the primary contributors to these emission increases. The NO_x emission increases that would result from implementation of the MOB 1 scenario would amount to about 3 percent of the total NO_x emissions generated by Sedgwick County in 2008 (see Table 3-31).

Table 4-29. Annual Operations Emissions Under the MOB 1 Scenario at McConnell AFB, CY 2016

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2e} (mt)
KC-46A Aircraft Operations	50.07	201.73	837.56	45.42	2.92	2.49	125,647
On-Wing Aircraft Engine Testing – KC-46A	14.39	49.54	28.94	2.34	0.21	0.19	6,286
Aerospace Ground Support Equipment – KC-46A	0.59	4.22	4.80	0.18	0.71	0.65	858
Transient Aircraft	11.89	52.46	97.63	8.46	6.72	6.72	20,676
Aerospace Ground Support Equipment – Existing Aircraft	0.59	4.25	4.84	0.19	0.71	0.65	865
GMVs/Nonroad Equipment	1.09	5.08	12.32	0.45	1.22	0.91	2,271
Privately Owned Vehicles – On Base	0.10	5.34	0.70	0.02	0.06	0.03	933
Privately Owned Vehicles – Off Base	0.56	25.92	4.57	0.07	0.55	0.28	4,798
Mobile Fuel Transfer Operations	0.10	[a]	[a]	[a]	[a]	[a]	[a]
Point and Area Sources	[a]	6.80	10.20	0.23	[a]	[a]	[a]
Total McConnell AFB – MOB 1 Scenario	**79.37**	**355.33**	**1,001.56**	**57.36**	**13.09**	**11.91**	**162,334**
Existing McConnell AFB Emissions	**40.79**	**335.90**	**493.25**	**40.43**	**12.89**	**11.63**	**117,551**
McConnell AFB MOB 1 Scenario Minus Existing Emissions	**38.58**	**19.44**	**508.31**	**16.93**	**0.20**	**0.29**	**44,783**
MOB 1 Scenario Net Emissions Increase Fraction of Sedgwick County Emissions	**0.001**	**0.0001**	**0.02**	**0.02**	**0.000001**	**0.00001**	**0.01**
PSD Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

[a] Source does not emit particular pollutant.

Key: CO_{2e} (mt) – carbon dioxide equivalent in metric tons

Similar to what is described above for the proposed FTU scenario, NO_X emission increases from the MOB 1 scenario would likely not have the potential to contribute to an exceedance of the NO_2 NAAQS.

The NO_x emissions from implementation of the MOB 1 scenario would occur in an area that is in jeopardy of not continuing to attain the NAAQS for O_3. These emissions would represent a 2 percent annual increase and a potential 2 ton, or more, daily increase in NO_x emissions in the region. Therefore, the increase in NO_x (and VOC) emissions resulting from implementation of

the MOB 1 scenario, in combination with all other sources of those precursor emissions in Sedgwick County on a given day, could be substantial enough to contribute to an exceedance of the O_3 NAAQS in the region.

Early in its planning, the USAF reconsidered its operational assumptions and projections to avoid or reduce potential impacts to the extent feasible. This resulted in the development of alternatives that reduced the emissions of criteria pollutants to the extent feasible by reducing the number of near-field operations, such as landing and take-off operations. At this time, the USAF is not aware of any other feasible mitigations that could be applied to further reduce the emissions impact from KC-46A aircraft operations and on-wing engine testing activities.

Proposed operations under the FTU and MOB 1 scenarios at McConnell AFB would emit HAPs that could potentially impact public health. Proposed KC-46A aircraft operations and on-wing engine testing activities would generate the majority of HAPs from these scenarios. As discussed above for proposed criteria pollutant impacts, since proposed KC-46A operations would occur intermittently over a volume of atmosphere, they would produce minimal ambient impacts of HAPs in a localized area.

In addition to presenting estimates of GHG emissions that would result from the KC-46A scenarios at McConnell AFB, the following considers how climate change may impact the KC-46A beddown scenarios at McConnell AFB. For McConnell AFB, the projected climate change impact of concern is increased aridity, as documented in *Global Climate Change Impacts in the United States* (USGCRP 2009). This report predicts that in the future, the Great Plains region surrounding McConnell AFB will experience warmer temperatures and decreasing precipitation. These conditions will produce not only more frequent extreme events such as heat waves, droughts, scarcities of water supplies, but also heavy rainfall. While operations at McConnell AFB have already adapted to droughts, high temperatures, and scarce water supplies, exacerbation of these conditions in the future may increase the cost of proposed operations at McConnell AFB and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts.

4.4.3 Safety

This section addresses the potential environmental consequences to flight and ground safety that could occur at or in the vicinity of McConnell AFB with implementation of either the KC-46A FTU or MOB 1 scenario. The addition of up to eight aircraft associated with the FTU scenario would cause an increase in airfield operations and could increase both flight and ground safety risk.

Replacement of the existing 44 PAA KC-135 mission with the new 36 PAA KC-46A MOB 1 scenario would be expected to result in similar flight and ground safety consequences.

4.4.3.1 FTU Scenario Safety Consequences

The FTU scenario would be a new mission at McConnell AFB, resulting in additional new aircraft operations, which could increase safety consequences.

4.4.3.1.1 Flight Safety

Aircraft Mishaps – Although there would be an increase in operations with the addition of the FTU scenario, KC-46A aircraft would utilize the existing flight patterns and AR tracks as those used by the KC-135 mission. As discussed previously, the accident rate for the KC-46A is expected to be similar to that of the commercial airframe upon which it is based. Using the

accident rate of 0.36 per flight cycle, it is projected that the probability of a KC-46A accident in the vicinity of the airfield would be low (less than one every 100 years; see Volume II, Appendix B, Section B.3.3.1).

Therefore, implementation of the KC-46A FTU scenario at McConnell AFB is not anticipated to result in any net increase in the safety risks associated with aircraft mishaps or any increase in the risks of occurrence of those mishaps.

Bird/Wildlife-Aircraft Strike Hazard – The addition of eight aircraft could slightly increase the risk of aircraft accidents due to bird/wildlife-aircraft strikes. Ongoing elements of the McConnell AFB BASH Plan would continue.

Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology as a tool for analysis and correlation of bird habitat, migration, and breeding characteristics with key environmental and manmade geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings, which take place prior to any sortie.

With proposed KC-46A flight operations similar to those being conducted by KC-135 aircraft at McConnell AFB, the overall potential for bird/wildlife-aircraft strikes is not anticipated to be significantly greater than current levels. All safety actions in place for existing KC-135 operations would continue to be in place for the KC-46A aircraft. McConnell AFB personnel have developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and have documented detailed procedures to monitor and react to heightened risk of bird strikes. When bird/wildlife-aircraft strike hazard risks increase, limits are placed on low-altitude flight and some types of training (e.g., multiple approaches, closed-pattern pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the potential for bird strikes is high within the airspace. KC-46A pilots would be subject to these procedures. Therefore, no significant impact would occur related to bird/wildlife-aircraft strike hazard issues.

4.4.3.1.2 Ground Safety

There are no aspects of the KC-46A FTU scenario at McConnell AFB that are expected to create new or unique ground safety issues not already addressed by current policies and procedures. Operations and maintenance procedures, as they relate to ground safety, are conducted by base personnel and would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulations, technical orders, and AFOSH standards.

No unique construction practices or materials would be required as part of any of the renovation, addition, or construction projects associated with the KC-46A FTU scenario at McConnell AFB. All renovation and construction activities would comply with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements. The USAF does not anticipate any significant safety impacts as a result of construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented.

The KC-46A would be operated in an airfield environment similar to the current operational environment. Since the KC-46A is a new airframe and would require response actions specific to the aircraft, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the KC-46A and associated

equipment. With this update, the McConnell AFB airfield safety conditions would be similar to baseline conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

As stated previously in Section 3.4.7, incompatible development exists within APZ I and APZ II. Additionally, the land directly south and east of McConnell AFB is identified as a future growth area for the Cities of Wichita and Derby. Coordination between McConnell AFB and the localities, and consideration of AICUZ guidelines, would minimize the impact of future development on the mission of McConnell AFB. See Volume II, Appendix B, Figure B-1, for the typical generic CZ and APZ dimensions.

4.4.3.2 MOB 1 Scenario Safety Consequences

The MOB 1 scenario would replace the existing KC-135 mission with fewer aircraft, although annual airfield operations would be higher.

4.4.3.2.1 Flight Safety

Aircraft Mishaps – Although there would be an increase in operations with replacement of the KC-135 mission, KC-46A aircraft would utilize the same flight patterns and AR tracks as those used by the KC-135 mission.

As discussed previously, the accident rate for the KC-46A is expected to be similar to that of the commercial airframe upon which it is based. Using the accident rate of 0.36 per flight cycle, it is projected that the probability of a KC-46A accident in the vicinity of the airfield would be low (less than one every 100 years; see Volume II, Appendix B, Section B.3.3.1).

Therefore, implementation of the KC-46A MOB 1 scenario at McConnell AFB is not anticipated to result in any net increase in the safety risks associated with aircraft mishaps or any increase in the risks of occurrence of those mishaps.

Bird/Wildlife-Aircraft Strike Hazard – Because the KC-46A MOB 1 mission would replace the current tanker mission, the same risk of aircraft accidents due to bird/wildlife strikes that are currently occurring would be expected to continue with implementation of the MOB 1 scenario. In addition, ongoing elements of the McConnell AFB BASH Plan would continue.

Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology as a tool for analysis and correlation of bird habitat, migration, and breeding characteristics with key environmental and manmade geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings, which take place prior to any sortie.

With KC-46A flight operations similar to those being conducted by KC-135 aircraft at McConnell AFB, the overall potential for bird/wildlife-aircraft strikes is not anticipated to be significantly greater than current levels. All safety actions in place for existing KC-135 operations would continue to be in place for the KC-46A aircraft. McConnell AFB personnel have developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and have documented detailed procedures to monitor and react to heightened risk of bird strikes. When bird/wildlife-aircraft strike hazard risks increase, limits are placed on low-altitude flight and some types of training (e.g., multiple approaches, closed-pattern pattern work) in the airport and airspace environments. Special briefings are provided to pilots whenever the

potential for bird strikes is high within the airspace. KC-46A pilots would be subject to these procedures. Therefore, no significant impact would occur related to bird/wildlife-aircraft strike hazard issues.

4.4.3.2.2 Ground Safety

There are no aspects of the KC-46A MOB 1 scenario at McConnell AFB that are expected to create new or unique ground safety issues not already addressed by current policies and procedures. Operations and maintenance procedures, as they relate to ground safety, are conducted by base personnel and would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulations, technical orders, and AFOSH standards.

No unique construction practices or materials would be required as part of any of the renovation, addition, or construction projects associated with the KC-46A MOB 1 scenario at McConnell AFB. All renovation and construction activities would comply with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements. The USAF does not anticipate any significant safety impacts as a result of construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented.

The KC-46A would be operated in an airfield environment similar to the current operational environment. Since the KC-46A is a new airframe and would require response actions specific to the aircraft, the emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving the KC-46A and associated equipment. With this update, the McConnell AFB airfield safety conditions would be similar to baseline conditions. Therefore, no significant impact would occur from aircraft mishaps or mishap response.

As stated previously in Section 3.4.7, incompatible development exists within APZ I and APZ II. Additionally, the land directly south and east of McConnell AFB is identified as a future growth area for the Cities of Wichita and Derby. Coordination between McConnell AFB and the localities, and consideration of AICUZ guidelines, would minimize the impact of future development on the mission of McConnell AFB.

4.4.4 Soils and Water

4.4.4.1 FTU Scenario Soils and Water Consequences

All of the C&D activities associated with the proposed KC-46A FTU scenario would occur within the McConnell AFB boundary. The majority of this work would occur on previously disturbed areas. As shown in Table 2-15, the total disturbed area for the projects associated with the FTU scenario would not exceed 7 acres (the area for new construction and additions/alterations).

For any projects that result in soil disturbance, the USAF would ensure that all construction activities are conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. The USAF would specify compliance with the stormwater discharge permit in the contractor construction requirements.

Improvements to the deicing containment system would occur as part of the proposed action. Improvements would include an expansion of two deicing pads to accommodate the wider

wingspan of the KC-46A, replacement of the existing underground holding tank with tanks sized appropriately to the expanded deicing pads, and replacement of various components of the deicing system (valves, piping, wet well, pump, etc.). The third existing deicing pad, along with the existing holding tank, would be decommissioned in place.

The NPDES permit includes provisions for deicing activities within Drainage Area 1-19, and the renewed permit would include a brief description of the new deicing holding tanks. The permit requires monitoring of biological oxygen demand (BOD) levels in drainages where deicing occurs. Past monitoring results in Drainage Area 1-19 have shown permit exceedances of BOD in the stormwater outfall. These exceedances have been reported to the Kansas Department of Health and Environment (KDHE). While the exact cause of the elevated BOD is not known, it is likely related to some deicing fluid entering the stormwater outfall. The deicing fluid used at McConnell AFB consists of a propylene glycol solution. Propylene glycol degrades in aquatic habitats such as streams and rivers. As propylene glycol degrades, oxygen in the aquatic habitat is used up and becomes unavailable to aquatic life. McConnell AFB, in coordination with the KDHE, will continue to implement the best management practices described in Section 3.4.4.4.2.1 to reduce the potential for deicing fluids to enter surface waters at this outfall.

Improvements to the current deicing system will be designed to increase the operational efficiency of the deicing process and minimize the amount of deicing fluid entering Drainage Area 1-19. Although the deicing system improvements will be designed to minimize deicing fluid entering the outfall, the extent to which the improvements will improve BOD levels in the outfall is not known at this time. Monitoring and active management would continue with the implementation of the FTU scenario.

The increase in flying operations resulting from the KC-46A FTU scenario at McConnell AFB has the potential to increase the use of deicing fluids and thereby increase the amount of deicing fluid in stormwater runoff. This increase is anticipated to be minor, as the number of aircraft operations has less of an influence on the amount of stormwater runoff entering the deicing system than the amount of precipitation potentially occurring at the time of deicing. McConnell AFB has coordinated with the KDHE regarding the proposed deicing project and it is not anticipated that this project would change the requirements of the existing NPDES permit. The permit covers industrial activities in Drainage Area 1-19, including deicing. Since the nature of the activity (aircraft deicing) is not changing, a change to the permit is not required. Coordination will continue with the KDHE during the design phase of the project. McConnell AFB has also coordinated with the City of Wichita wastewater treatment plant on discharges from the proposed deicing system.

For the reasons described above, the potentially minor increase in deicing fluid contained in stormwater runoff resulting from the increase in aircraft operations would be a minor adverse impact should that runoff be conveyed to Outfall 19. The improvements to the deicing system are anticipated to result in less deicing fluid entering the stormwater runoff. Therefore, the expansion of the deicing pads in stormwater Drainage Area 1-19 has the potential for both minor adverse and beneficial impacts to the quality of stormwater runoff in this drainage area.

The McConnell AFB SWPPP for industrial facilities identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. The SWPPP would be updated to reflect the land disturbance associated with the proposed KC-46A development projects.

Additionally, an approved Erosion and Sediment Control Plan would be followed during construction, and standard construction practices, in accordance with the CWA, would be

implemented to retain run-off and promote recharge of groundwater. No mitigation measures would be required because no significant impacts are anticipated to result from the development associated with the FTU scenario. No sensitive groundwater resources or surface water resources would be impacted within the project areas of the FTU beddown.

4.4.4.2 MOB 1 Scenario Soils and Water Consequences

All of the C&D activities associated with the proposed KC-46A MOB 1 scenario would occur within the McConnell AFB boundary. The majority of this work would occur on previously disturbed areas. As depicted in Table 2-18, the total disturbed area for projects associated with the MOB 1 scenario at McConnell AFB would not exceed 12 acres.

For any projects that result in soil disturbance, the USAF would ensure that all construction activities are conducted in accordance with the applicable stormwater discharge permit to control erosion and prevent sediment, debris, or other pollutants from entering the stormwater system. The USAF would specify compliance with the stormwater discharge permit in the contractor construction requirements.

Construction of the deicing pads in the stormwater Drainage Area 1-19 has the potential for both minor adverse impacts and beneficial impacts to stormwater runoff in the drainage area. These impacts would be the same as those described for the FTU scenario. However, due to a smaller increase in aircraft operations for the MOB 1 scenario, impacts associated with the MOB 1 scenario could be less than those described for the FTU scenario.

The McConnell AFB SWPPP for industrial facilities identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. The SWPPP would be updated to reflect the land disturbance associated with the proposed KC-46A development projects.

The proposed addition to Building 1220 is for the storage of mobility bags. These bags are loaded upon aircraft during troop deployments and therefore the storage of these bags must be in close proximity to the mobility ramp. Factors considered when siting the mobility bag storage area included environmental opportunities/constraints (e.g., noise, floodplain, land use compatibility, threatened and endangered species, historic preservation, cultural resources, and airfield surfaces). Facility requirements and utility availability; Anti-Terrorism/Force Protection (AT/FP) criteria; and the functional relationship to other facilities for energy savings potential, parking, size/massing, and aesthetics were also considered. Building 1220, which serves as the existing mobility bag storage, was the only facility considered suitable to partially meet this storage requirement. This facility would require an 8,000-square-foot addition to accommodate the KC-46A MOB 1 scenario. The proposed location for this addition would be in a 100-year floodplain. The USAF did consider an alternate location on the west side of Building 1220 in an area outside of the floodplain. However, construction on this side of Building 1220 would impact a main utility trunk line serving the control tower and the entire Kansas Air National Guard (KANG) complex located on the opposite side of the flightline from Building 1220. The trunk line contains approximately 400 pairs of copper cabling and over 200 fiber optic strands. Construction is not possible over the top of the trunk line, would cost over $1 million to relocate, and is prohibitive. To the maximum extent practical, land disturbance in floodplains has been avoided and although the addition would avoid stream impacts, a Finding of No Practicable Alternative (FONPA) would be required should McConnell AFB be selected for the MOB 1 scenario. The FONPA would be prepared in accordance with 32 CFR 989 and Executive Order (EO) 11988, *Floodplain Management*.

To minimize potential impacts, construction would follow guidelines for construction in the floodplain, including elevating structures above the base flood level; placing sensitive equipment on upper levels of facilities; constructing sidewalks, roads, and parking lots with pervious materials; and creating new stormwater retention areas for projects that create net impervious surface areas, to the maximum practicable extent. McConnell Creek is a jurisdictional stream and the project would be outside the jurisdictional boundaries of the stream.

All of the development locations, including those near water resources, would be re-graded after construction to pre-construction contours. Although short-term, minor effects on water resources could result from work in the floodplain of McConnell Creek, long-term, minor, adverse effects on water resources at McConnell AFB are not anticipated to result from implementation of the KC-46A MOB 1 scenario.

4.4.5 Biological Resources

4.4.5.1 FTU Scenario Biological Resources Consequences

4.4.5.1.1 Vegetation

The FTU scenario at McConnell AFB would have similar potential impacts on vegetation as described for the FTU scenario at Altus AFB. All of the projects would occur in currently developed or disturbed areas that provide little habitat value and would result in no significant impacts on vegetation.

4.4.5.1.2 Wildlife

Potential impacts on wildlife would also be similar to those described previously for the other alternative bases. Some individual animals could be subject to displacement or mortality due to construction activities and new structure siting. However, the affected areas likely do not function as important habitat for wildlife on the base or surrounding vicinity, and the number of individuals affected would be small relative to total population numbers in the region. As described for the other alternative bases, noise produced by construction, renovation, and demolition activities would result in no significant impacts on wildlife populations.

Although the KC-46A is quieter than the KC-135, the number of annual airfield operations would increase, resulting in slight noise increases on and near McConnell AFB and the associated auxiliary airfields. Potential effects on wildlife would be similar to those described for the other alternative bases. However, only modest increases in DNL noise contours would result from the FTU beddown.

With the exception of the proposed deicing pad expansion, overall effects on wildlife would be similar to those described for the other alternative bases. Minor adverse and minor beneficial impacts to aquatic life could occur as a result of expanded deicing activities in Drainage Area 1-19 (see Section 4.4.4.1). Adverse impacts, should they occur, are anticipated to be minor and short term, and no significant wildlife impacts are anticipated to result from implementation of the KC-46A FTU scenario at McConnell AFB.

4.4.5.1.3 Special-Status Species

Because no special-status species and/or designated critical habitat occur at McConnell AFB, no significant impacts on special-status species are anticipated to result from the FTU scenario at McConnell AFB.

4.4.5.1.4 Wetlands

No known wetlands are present in any of the areas proposed for development under the FTU scenario; therefore, impacts on wetlands are not anticipated.

4.4.5.2 MOB 1 Scenario Biological Resources Consequences

4.4.5.2.1 Vegetation

The proposed MOB 1 scenario at McConnell AFB would have similar potential impacts on vegetation as described for the MOB 1 scenario at Altus AFB. All of the projects would occur in currently developed or disturbed areas that provide little habitat value and would result in no significant impacts on vegetation.

4.4.5.2.2 Wildlife

Potential wildlife impact categories would be the same as those described for the other alternative bases. Some individuals could be subject to displacement or mortality due to construction activities and new structure siting. However, the affected areas likely do not function as important habitat for wildlife on the base or surrounding vicinity, and the number of individuals affected would be small relative to total population numbers in the region. As described for the other alternative bases, noise produced by construction, renovation, and demolition activities would result in no significant impacts on wildlife populations.

Airfield operations would increase slightly, resulting in slight noise increases on and near the base. Potential noise-related effects on wildlife would be similar to those described for the other alternative bases. Because the KC-46A is quieter than the KC-135, only modest noise increases are anticipated, and there would not be a substantial increase in wildlife habitat exposed to increased noise levels. Much of the area subject to increased noise levels consists of developed or residential land use.

Increased operations would increase the potential for aircraft to strike birds and other wildlife in the air and on the runway. However, continued adherence to the base's BASH Plan would minimize the risk.

With the exception of the proposed deicing pad expansion, overall impacts on wildlife would be similar to those described for the other alternative bases. Minor adverse and minor beneficial impacts to aquatic life could occur as a result of expanded deicing activities in Drainage Area 1-19 (see Sections 4.4.4.1 and 4.4.4.2). Adverse impacts, should they occur, are anticipated to be minor and short term, and no significant wildlife impacts are anticipated to result from implementation of the KC-46A MOB 1 scenario at McConnell AFB.

4.4.5.2.3 Special-Status Species

Because no special-status species and/or designated critical habitat occur at McConnell AFB, no significant impacts on special-status species are anticipated to result from implementation of the MOB 1 scenario at McConnell AFB.

4.4.5.2.4 Wetlands

No known wetlands are present in any of the areas proposed for development under the MOB 1 scenario; therefore, impacts on wetlands are not anticipated.

4.4.6 Cultural Resources

4.4.6.1 FTU Scenario Cultural Resources Consequences

None of the buildings proposed to support the FTU scenario at McConnell AFB are considered eligible for listing on the NRHP (see Volume II, Appendix A, Section A.5.4). No impacts on archaeological historic properties are anticipated to result from implementation of the FTU scenario. The Kansas SHPO has concurred with the USAF's finding (letter from SHPO to USAF dated 18 June 2013; see Volume II, Appendix A, Section A.5.4.2). Ground-disturbing activities would occur in previously disturbed contexts. Those areas not already beneath previously modified surfaces have been surveyed for the presence of archaeological resources; no NRHP-eligible archaeological sites have been found, and it is extremely unlikely that such historic properties would be located in the course of this proposed action. It is also extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. It is still possible that archaeological resources could be buried on McConnell AFB (McConnell AFB 2004b). In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA, as specified in standard operating procedures described in the ICRMP (McConnell AFB 2004b). Such mitigation could take the form of additional documentation or other actions agreed to by the USAF and SHPO.

Indirect impacts on cultural resources from population increase or visual intrusions are extremely unlikely. Under the FTU scenario, the population would increase by a very small amount, especially in light of the existing population at the base and in Wichita. New construction would occur in the context of an active Air Force Base, where changes in the infrastructure are common and are not considered to be an impact. There is no historic district, nor would the viewshed of any historic properties be affected by the proposed construction.

No construction or change in airspace use is associated with use of auxiliary airfields for the KC-46A FTU scenario. There would be no impact on cultural resources at CSM, ICT, or FOE.

No adverse Section 106 impacts to tribal resources are anticipated. The USAF initiated consultation with 12 tribes. Responses were received from seven tribes indicating no issues of concern, as well as one request for a copy of the Draft EIS. Additional efforts were made to contact the remaining five non-responsive tribes by e-mail and telephone without success (see Table A-1 in Volume II, Appendix A, Section A.3). While the USAF values its relationship with all tribes and will continue to consult on other planning efforts or matters of known or potential interest to tribes, Section 106 consultation on the KC-46A FTU beddown proposed alternative at McConnell AFB is now complete.

4.4.6.2 MOB 1 Scenario Cultural Resources Consequences

Actions associated with the proposed KC-46A MOB 1 scenario at McConnell AFB would include the demolition of facilities; renovation of 11 buildings; replacement of a section of tarmac (runway, two taxiways and an apron); and additions/alterations to four facilities, including trainers and a fuels hydrant on an apron. McConnell AFB has determined that three buildings associated with the MOB 1 scenario are eligible for listing on the NRHP: Buildings 1106, 1107, and 1218. Demolition of Building 1106 would be an adverse effect, while renovations to Buildings 1107 and 1218 would be effects, but not adverse effects. McConnell AFB has also determined that the remaining buildings and structures associated with the MOB 1 scenario are not eligible for listing on the NRHP. The Kansas SHPO has concurred with all of these findings. McConnell AFB and the Kansas SHPO have signed a MOA agreeing

to measures that mitigate the adverse effect on historic properties that would result from implementation of the MOB 1 scenario at McConnell AFB (see Volume II, Appendix A, Section A.5.4.9).

Ground-disturbing activities would occur in previously disturbed contexts. Those areas not already beneath previously modified surfaces have been surveyed for the presence of archaeological resources; none has been located. It is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. It is still possible that archaeological resources could be buried on McConnell AFB (McConnell AFB 2004b). In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA, as specified in standard operating procedures described in the ICRMP (McConnell AFB 2004b).

Indirect effects on cultural resources from population increase or visual intrusions are extremely unlikely. Under the MOB 1 scenario, the population would increase by a very small amount. New construction would occur in the context of an active Air Force Base, where changes in the infrastructure are common and are not considered to be an impact. There is no historic district, nor would the viewshed of any historic properties be affected by the proposed construction.

McConnell AFB consulted with the same tribes as described in the FTU scenario. No adverse Section 106 impacts to any tribal resources are anticipated. Tribal responses for the MOB 1 scenario were the same as those described for the FTU scenario. Section 106 consultation on the KC-46A MOB 1 beddown proposed alternative at McConnell AFB is now complete.

4.4.7 Land Use

4.4.7.1 FTU Scenario Land Use

4.4.7.1.1 Physical Development

The majority of the physical development proposed to implement the FTU scenario at McConnell AFB would occur in existing industrial areas along the flightline, with the exception of the new Flight Training Center which would occur in an adjacent administrative area. The proposed construction, demolition, and activities are consistent with the current and future layout and organization of land use in the base's 2011 Installation Development Plan.

Subsequent operations and maintenance activities would conform to current and future land uses on base. Indirect effects from construction (such as noise, truck traffic, and dust) could result from implementation of the FTU scenario. However, these effects would be temporary and minor; there would be no long-term effect. Consequently, none of the physical development associated with implementation of the KC-46A FTU scenario at McConnell AFB is anticipated to result in impacts to land use.

Implementation of the FTU scenario would potentially require 141 housing units. There is no vacant family housing currently available on base. Considering the population of the surrounding area, the local housing market is expected to absorb the near-term housing demand through either rentals or home sales without the need for new residential development. In the future, the privatization contractor would provide additional housing through renovation and new construction on base, as needed (HQ AETC 2013). Assuming any future residential development conforms to existing base plans and compatible land use recommendations (as per the AICUZ study), future residential development associated with implementation of the FTU scenario is not anticipated to pose land use concerns.

Development proposed as part of the FTU scenario is not located close to the base boundary and, therefore, would have little impact on surrounding areas. The increase in personnel and family members would increase daily commuting to the base. The Installation Development Plan projects that the base access gates and roadway system are adequate and can meet future mission needs (McConnell AFB 2011a).

4.4.7.1.2 Aircraft Operations

Implementation of the FTU scenario would double the number of aircraft operations at McConnell AFB. Volume II, Appendix C, Section C.1.3.2, presents the noise compatibility guidelines for noise exposure and various land uses, along with recommended noise abatement measures to reduce incompatible exposure levels.

Implementation of the FTU scenario at McConnell AFB would expose 369 additional (15 percent increase) acres to noise equal to or greater than 65 dB DNL, of which 273 acres are located outside the base. As shown on Figure 4-5, the areas exposed to these increased noise levels are primarily located north and east of the current noise envelope. On base, slight increases in noise are not expected to impact current or future land uses or mission activities. Although a slight increase (of about 1 dB) in noise exposure at the on-base child care facility is not optimal, it would not result in a significant impact. In off-base areas, FTU scenario 65 dB DNL noise contours are contained almost entirely within the extent of noise contours published in the 2004 McConnell AICUZ Report (see Figure 3-4).

Outside the base, levels of 65 dB DNL and higher would shift north in the community of Eastridge in areas zoned for commercial and residential use. The change in noise exposure at any given location could be between 1 and 3 dB. This neighborhood is mostly developed, with little potential for substantial change or future increase in density. Similarly, to the southwest, a slight increase could also affect a small pocket of residential use land on the east side of U.S. Highway 15. This change may be noticeable to some persons, and would result in a moderate impact on residential land use in these two locations.

Current zoning around the base would allow for new residential, commercial, and industrial development, which may be incompatible with accident potential and increased noise around the airfield. Although the protection overlay district allows the Zoning Administrator to approve an adjustment to property development standards within the district (Wichita/Sedgwick 2009), none have been formally adopted to date. As such, the potential for incompatible future development still exists. Several efforts are underway to update comprehensive plans and, subsequently, zoning for the surrounding areas. In the meantime, continued coordination between the base and the zoning administrators of surrounding areas would reduce the potential for approval of future incompatible development.

4.4.7.1.3 Aircraft Operations – Auxiliary Airfields

KC-46A aircrews associated with the FTU scenario would use three different auxiliary airfields. However, these airfields would only be used to practice aircraft operations with no associated ground level development, and the noise increases resulting from aircraft operations noise at these airfields are projected to be less than 0.5 dB. Therefore, no changes to land use are anticipated from the use of the auxiliary airfields by KC-46A aircrews associated with the FTU scenario.

4.4.7.2 MOB 1 Scenario Land Use

4.4.7.2.1 Physical Development

The impacts on land use resulting from physical development associated with implementation of the MOB 1 scenario at McConnell AFB are similar to those associated with the FTU scenario, as described in Section 4.4.7.1.1. However, implementation of the MOB 1 scenario would involve substantially more new construction, renovation, and development. All of the projects proposed under the MOB 1 scenario are located in areas that are suitable for the intended mission functions.

Implementation of the MOB 1 scenario would result in a potential decrease in the need for 111 housing units.

4.4.7.2.2 Aircraft Operations

Impacts on land use resulting from the airfield operations associated with the MOB 1 scenario at McConnell AFB would be less than those described for the FTU scenario at McConnell AFB. Because the KC-46A is quieter than the KC-135 and total airfield operations would be less under the MOB 1 scenario than under the FTU scenario, noise exposure associated with the MOB 1 scenario surrounding the base is projected to decrease from current levels. Specifically, the area exposed to noise levels of 65 dB DNL or greater outside the base would decrease by about 386 acres compared with baseline conditions. This would result in a slight benefit to surrounding land uses such as residential areas, from lower noise.

As described in the safety sections (3.4.3 and 4.4.3), the accident rate is expected to be very low. Because the accident potential would remain low and the pre-existing incompatible uses are relatively minimal (with low-density residential and one incompatible commercial business), significant impacts on land use resulting from implementing the MOB 1 scenario are not expected.

4.4.7.2.3 Aircraft Operations – Auxiliary Airfields

There are no projected operations at auxiliary airfields for the MOB 1 scenario at McConnell AFB.

4.4.8 Infrastructure

Refer to Section 3.4.8 for a description of existing infrastructure system capacities and conditions at McConnell AFB. Table 2-16 provides changes in population due to implementation of the FTU scenario and Table 2-19 indicates changes in population due to the MOB 1 scenario at McConnell AFB. These changes in population and proposed development were used to determine the impact on infrastructure. For each scenario, the maximum demand or impact on capacity was calculated for the potable water, wastewater, electric, and natural gas systems based on the change in population. To identify maximum demand or impact on these systems, any change in population was assumed to live on base. For the assessment of the transportation infrastructure, any change in population was assumed to reside off base.

4.4.8.1 FTU Scenario Infrastructure Consequences

4.4.8.1.1 Potable Water System

Between 2006 and 2010, the average per capita potable water demand in the City of Wichita was 137 GPD (KDA 2012). Using that amount as a planning factor, the change in population for the

FTU scenario would create an additional water use demand of 0.13 MGD. This scenario would increase average daily demand from 10 to 15 percent of base system capacity and peak demand from 14 to 19 percent of base system capacity.

4.4.8.1.2 Wastewater

The USEPA estimates that the average person generates approximately 100 GPD of wastewater between showering, toilet use, and general water use (USEPA 2013c).

Using this planning factor along with the change in population, the FTU scenario would increase average daily wastewater discharge from McConnell AFB by 0.1 MGD. This would increase average daily discharge from 7 to 9 percent of base system capacity and peak discharge from 27 to 29 percent of base system capacity.

4.4.8.1.3 Stormwater System

In general, the stormwater drainage system at McConnell AFB provides adequate collection to manage water from developed areas and prevent site erosion to meet current mission requirements. However, the lack of on-base retention basins reduces the ability to manage stormwater during peak flow events.

The majority of this work would occur in previously disturbed areas. Table 2-17 identifies the projects associated with the FTU scenario; the total potential disturbed area associated with these projects would not exceed 7 acres (new construction and additions/alterations). During the short-term construction period for the FTU scenario, the contractor would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management during construction. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales, and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures. A SWPPP update would be required, and the requirements of the EISA would be followed to maintain or restore, to the maximum extent practical, the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow.

4.4.8.1.4 Electrical System

To estimate the change in residential electrical use associated with personnel and their dependents, data from the USEIA were used to identify that residential consumers averaged about 11.8 kilowatt hours (KWH) per person per year (1,215,411 users) in Kansas in 2011 (the best available statistics), with a total of about 14,343,748 MWH consumed in 2011 (USEIA 2011). Using that amount as a planning factor along with the change in population, implementation of the FTU scenario would increase the state annual residential demand for electricity by 10,952 MWH per year. This represents less than 1 percent of total state-wide usage in 2011. Assuming the change in population resides on McConnell AFB and uses electricity at the 2011 residential average rate of 0.04 MWH per person per day, the FTU scenario would increase the average daily use of electricity by 30.01 MWH per day. Implementation of the FTU scenario would increase daily demand from 47 to 56 percent of base system capacity and peak demand from 60 to 69 percent of base system capacity.

4.4.8.1.5 Natural Gas System

To estimate the additional residential natural gas use associated with personnel and their dependents, data from the USEIA were used to identify that residential consumers averaged about 0.08 MMcf per person per year (854,730 users) in Kansas in 2011, with a total of about 65,499 MMcf consumed (USEIA 2011). Using that amount as a planning factor along with the change in population, implementation of the FTU scenario would increase state annual residential demand for natural gas by 72 MMcf per person. This represents less than 1 percent of the total state-wide residential usage in 2011. Assuming the change in population reside on McConnell AFB and uses natural gas at the 2011 residential average rate of 0.21 Mcf per person per day, implementation of the FTU scenario would increase the average daily use of natural gas by 191 Mcf per person per day. The FTU scenario would increase average daily demand from 16 to 23 percent of base system capacity and peak demand from 36 to 43 percent of base system capacity.

4.4.8.1.6 Solid Waste Management

Using an estimating multiplier methodology developed by the USEPA (USEPA 2009b) to determine the amount of C&D debris, it is estimated that implementation of the FTU scenario would result in approximately 3,802 tons of C&D debris that would require recycling or removal to landfills. The DoD has set a target diversion rate of 60 percent of C&D debris by fiscal year 15 (DoD 2012) to be reused or recycled based on an integrated C&D debris diversion approach. Application of the 60 percent diversion target rate would result in approximately 2,281 tons being reused or recycled and approximately 1,521 tons being placed in the Brooks or Construction, Demolition & Recycle (CDR) Landfills or a combination of both. Both landfills have adequate capacity to accept the estimated C&D debris from the FTU scenario.

Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, LBP, or other hazardous components, would be managed in accordance with AFI 32-7042, "Waste Management."

4.4.8.1.7 Transportation

Implementation of any of the facilities and infrastructure projects for the KC-46A FTU scenario at McConnell AFB would require the delivery of materials to and removal of construction-related debris from demolition, renovation, and new construction sites. Trucks associated with these activities, along with construction crews, would access the base via the West Gate, which is the gate that all contractors and vendors must enter for inspections and identification badges. Construction-related traffic would comprise only a small portion of the total existing traffic volume in the area and at the base. The increased traffic could contribute to increased congestion at the West Gate, delays in the processing of access passes, and degradation of the affected road surfaces.

Additionally, intermittent traffic delays and temporary road closures could result in the immediate vicinity of the facility and infrastructure project sites. Potential congestion impacts could be avoided or minimized by scheduling truck deliveries outside of the peak inbound traffic time. Also, many of the heavy construction vehicles would be driven to the site and kept on base for the duration of the C&D activities, resulting in relatively few additional trips. Traffic delays would be temporary in nature, ending once construction activities have ceased. As a result, no long-term impacts to on- or off-base transportation infrastructure would result.

Implementation of the KC-46A FTU scenario at McConnell AFB would result in a slight increase in on-base mission personnel of 476 persons (full-time military, DoD civilians, other base personnel), or approximately a 10 percent increase in daily commuting traffic to and from the base. In addition to the increase in personnel, there would also be a small increase in dependent and commercial traffic. This assumes that all personnel and dependents live off base, work standard workdays, and drive individually to the base. For purposes of analysis, it is assumed that the additional students associated with the KC-46A FTU scenario would be housed on base and would not have an impact on daily traffic. The small increase in base mission personnel could increase congestion and queuing at the East Gate during morning and evening rush hours. To minimize this, the base could adjust the schedule of operations to accommodate this increase and/or provide additional personnel at the gate to process security checks during the peak hours. Regional access roads and the on-base road network have adequate capacity to absorb the small amount of additional traffic without major impacts on traffic flow, circulation, or level of service.

4.4.8.2 MOB 1 Scenario Infrastructure Consequences

4.4.8.2.1 Potable Water System

Based on the planning factor for potable water demand in the City of Wichita (see Section 4.4.8.1.1) along with the change in population associated with implementation of the MOB 1 scenario, there would be an increase in water demand of 0.03 MGD. Implementation of the MOB 1 scenario would increase average daily demand from 10 to 11 percent of base system capacity and would increase peak demand from 14 to 15 percent of base system capacity.

4.4.8.2.2 Wastewater

Implementation of the MOB 1 scenario would increase wastewater discharge by 0.02 MGD based on the USEPA wastewater planning factor (see Section 4.4.8.2.2) and the change in population. The MOB 1 scenario would increase peak discharge from 27 to 28 percent of base system capacity, while average daily discharge would remain unchanged at 7 percent of base system capacity.

4.4.8.2.3 Stormwater System

In general, the stormwater drainage system at McConnell AFB provides adequate collection to manage water from developed areas and prevent site erosion to meet current mission requirements. However, the lack of on-base retention basins reduces the ability to manage stormwater during peak flow events.

The majority of this work would occur on previously disturbed areas. Table 2-17 identifies the projects associated with the MOB 1 scenario; the total potential disturbed area associated with these projects would not exceed 12 acres (new construction and additions/alterations). During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls such as interceptor dikes, swales (excavated depressions), silt fences, straw bales, and other storm drain inlet protection, as necessary, to prevent sediment from entering inlet structures. A SWPPP update would be required, and the EISA would be followed for any disturbances of undeveloped land that exceed 5,000 square feet.

During the short-term construction period for the MOB 1 scenario, the contractor would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management during construction. The revised SWPPP and NPDES permits would be followed to

avoid and minimize the potential impacts that could occur during the short-term construction phase of the proposed new and renovated facilities or during operations under the MOB 1 scenario.

4.4.8.2.4 Electrical System

Using the USEIA planning factor (see Section 4.4.8.1.4) and the change in population, implementation of the MOB 1 scenario would increase the state annual residential demand for electricity by 2,007 MWH per year. This represents an increase of less than 1 percent of the state-wide residential usage in 2011. Assuming the change in population resides on McConnell AFB and uses electricity at the 2011 residential average rate of 0.04 MWH per person per day, the MOB 1 scenario would increase daily use of electricity by 5.5 MWH per day. The MOB 1 scenario would increase daily demand from 47 to 48 percent of base system capacity and peak demand from 60 to 61 percent of base system capacity.

4.4.8.2.5 Natural Gas System

Using the USEIA planning factor (see Section 4.4.8.1.5) and the change in population, implementation of the MOB 1 scenario would increase state annual demand for natural gas by 14 MMcf per person per year. This represents less than 1 percent of the state-wide usage in 2011. Assuming the change in population resides on McConnell AFB and uses natural gas at the 2011 residential average of 0.21 Mcf per person per day, implementation of the MOB 1 scenario would increase daily use of natural gas by 36 Mcf per day. The MOB 1 scenario would increase daily demand from 16 to 17 percent of base system capacity and peak demand from 36 to 38 percent of base system capacity.

4.4.8.2.6 Solid Waste Management

For the MOB 1 scenario, it is estimated that approximately 12,894 tons of C&D debris would require recycling or removal to landfills. The DoD has set a target diversion rate of 60 percent of C&D debris to be reused or recycled. Application of the 60 percent diversion target rate would result in approximately 7,736 tons being reused or recycled and approximately 5,158 tons being placed in the Brooks or CDR Landfills or a combination of both. Both landfills have adequate capacity to accept the estimated C&D debris from the MOB 1 scenario.

Contractors would be required to comply with Federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, LBP, or other hazardous components, would be managed in accordance with AFI 32-7042, “Waste Management.”

4.4.8.2.7 Transportation

Implementation of the KC-46A MOB 1 scenario at McConnell AFB would have potential impacts similar to those described for the FTU scenario. However, because the demolition, renovation, and construction projects would include more total square footage than the projects associated with the FTU scenario, the number of construction-related truck trips and numbers of construction workers, along with duration of the time to complete the projects, would be greater. However, this increase would still not have a significant impact on gate access or the level of service and flow of traffic on or off base.

After the completion of the KC-135 drawdown at McConnell AFB, the KC-46A MOB 1 scenario would result in a minor decrease in on-base mission personnel of 77 persons (full-time military, DoD civilians, other base personnel), a decrease of approximately 2 percent in daily commuting

traffic to and from the base. However, there would be a minor increase in military dependents and family members. It is assumed that all personnel and dependents live off base, work standard workdays, and drive individually to the base. This decrease in base mission personnel would have a negligible effect on congestion and queuing at base gates during the morning and evening rush hours. Regional access roads and the on-base road network have adequate existing capacity, and no impacts on traffic flow, circulation, or level of service would occur.

4.4.9 Hazardous Materials and Waste

4.4.9.1 FTU Scenario Hazardous Materials

Section 4.1.9.1 describes the hazardous materials management specific to the KC-46A aircraft. Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through HAZMART are adequate to handle the changes anticipated with the addition of the new aircraft associated with the FTU scenario, but would be expanded to meet the increased use.

4.4.9.1.1 Aboveground and Underground Storage Tanks

The addition of KC-46A aircraft at McConnell AFB would increase the maximum daily consumption of JP-8. The increase in fuel consumption would be supported by the current infrastructure at the base. Some of the new and remodeled facilities would require the addition of new ASTs, USTs, and hazardous materials and hazardous waste containers. The new and remodeled facilities would be constructed with berms and drains leading to OWSs, if required, to contain releases of petroleum products. The McConnell AFB SPCC Plan (McConnell AFB 2013b) would subsequently need to be amended to capture any changes in facility design, construction, operation, or maintenance that materially affect the potential for a discharge.

4.4.9.1.2 Toxic Substances

Demolition, renovation, and addition/alteration projects are planned as part of the McConnell AFB FTU scenario. The asbestos registry indicates that ACMs have been positively identified within parts of some of the buildings that would be affected by the proposed KC-46A projects. Volume II, Appendix E, Table E-5, contains a list of buildings that would be affected by the projects, their years of construction, and their potential for ACMs to be present. Prior to initiating the projects, ACM would be identified through sampling and analysis of building materials. Exposed friable asbestos would be removed in accordance with applicable Federal, state, local, and USAF rules and regulations. Before initiating the ACM removal work, the required notifications would be completed. No work on an ACM project would be conducted unless performed by persons with current certificates of training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of at a waste disposal site authorized to accept such waste. Additionally, the handling and disposal of ACM wastes would be performed in accordance with the McConnell AFB Asbestos Management and Operations Plan (McConnell AFB 2003) and in compliance with Federal, state, and local regulations. Transport and disposal documentation records, including signed manifests, would also be required.

Based on their years of construction, a few buildings that are proposed for renovation, alteration, or demolition have the potential for containing LBP. Volume II, Appendix E, Table E-5, contains a list of buildings proposed for modification under the FTU scenario, and their potential to contain LBP. According to standard operating procedures, LBP surveys would be conducted prior to any renovation or demolition activities. Demolition of structures known to contain LBP

would be conducted in accordance with applicable regulations. Proper disposal of any resulting lead-containing wastes would also be conducted in accordance with Federal regulations, including the Toxic Substances Control Act and the Occupational Safety and Health Act. Further, these wastes would be accompanied by a waste manifest and disposed of at an approved off-base disposal facility.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the KC-46A FTU scenario at McConnell AFB, and long-term benefits from removal of toxic substances are anticipated.

4.4.9.2 Hazardous Waste Management

McConnell AFB would continue to generate hazardous wastes during various operations and maintenance activities. Hazardous waste disposal procedures, including off-base disposal procedures, are adequate to handle changes in quantity and would remain the same. Hazardous waste anticipated to be generated by the KC-46A FTU scenario would be consistent with waste generated by the KC-135. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. Operations involving hexavalent chromium, cadmium, and halon (i.e., an ODS) have been eliminated or minimized to the extent possible (Boeing 2013). Hazardous materials such as TCE have available alternates and will not be required for the KC-46A. No new hazardous materials would be added that exceed McConnell AFB's current hazardous waste processes.

4.4.9.3 Environmental Restoration Program

Modifications and/or additions to existing buildings for the FTU scenario at McConnell AFB under the proposed action would occur in proximity to existing ERP sites. The USAF would coordinate with the restoration office before any modifications are initiated. Although formal construction waivers are not required, the USAF does require reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current EIAP processes, as specified in AFI 32-7061.

The USAF would ensure that modifications are coordinated with ongoing remediation or investigation activities at any Resource Conservation and Recovery Act site. However, if existing plans and procedures are followed, there would be no anticipated impacts on these ERP sites. During C&D activities, there is the potential to encounter contaminated soil and groundwater in areas associated with ERP sites. There is also the possibility that undocumented contaminated soils from historical fuel spills may be present. If encountered, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable Federal, state, and local regulations; AFIs; and base policies. If soil or groundwater contaminants are encountered during C&D activities, health and safety precautions, including worker awareness training, may be required.

The FTU scenario at McConnell AFB would require the demolition of Buildings 977, 978, 984, and 985 to construct a fuel cell, corrosion control, and maintenance hangar. The southern part of this proposed construction area overlies ERP site OWS 545 (Former Building 980) that has multiple contaminant sources consisting of releases from a former OWS, which was removed in 2006, and surface spills. Soils and groundwater have been impacted by heavy petroleum products, fuels, and VOCs (mostly TCE) (McConnell AFB 2013c). According to the Management Action Plan, there are no limitations on construction for site OW545. There are five groundwater

monitoring wells (B980-MW1, B980-MW3, and B980-MW6 through B980-MW8) within the proposed construction area that may need to be abandoned and replaced.

ERP site SS001 also has benzene and TCE plumes just north and east of the proposed fuel cell, corrosion control, and maintenance hangar. There is one groundwater monitoring well (SS01-MW14) within the proposed construction area that may need to be abandoned and replaced.

The depth to groundwater is generally 20 to 30 feet bgs across McConnell AFB (Knight 2013). There are no prohibitions regarding subsurface excavation. Groundwater at these depths would not be anticipated to be encountered during C&D activities.

As part of the new ramp and apron construction, existing concrete would be demolished and replaced. A substantial volume of construction debris and demolition waste could impact local and regional waste facilities/landfills. Further investigation and consideration of waste diversion strategies are needed to determine the degree of impact on solid waste facilities.

4.4.9.4 MOB 1 Scenario Hazardous Materials

Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through HAZMART are adequate to handle the changes anticipated with the MOB 1 scenario, but would be expanded to meet the increased use.

4.4.9.4.1 Aboveground and Underground Storage Tanks

Because the 36 KC-46A aircraft would replace the existing 44 PAA KC-135 aircraft, a potential reduction in the maximum daily consumption of JP-8 could occur. However, the increase in aircraft operations could account for increased JP-8 consumption even though eight fewer aircraft are proposed under the MOB 1 scenario. The increased fuel consumption would be supported by the current infrastructure. Some of the new and remodeled facilities would require the addition of new ASTs, USTs, and hazardous materials and hazardous waste containers. The new and remodeled facilities would be constructed with berms and drains leading to OWSs, if required, to contain releases of petroleum products. The McConnell AFB SPCC Plan (McConnell AFB 2013b) would subsequently need to be amended to capture any changes in facility design, construction, operation, or maintenance that materially affect the potential for a discharge.

4.4.9.4.2 Toxic Substances

The primary difference between the KC-46A FTU and MOB 1 scenarios at McConnell AFB would be the additional buildings that are proposed to be affected under the MOB 1 scenario. The same plans, provisions, and requirements for ACM and LBP described for the FTU scenario would apply to the MOB 1 scenario. Volume II, Appendix E, Table E-6, contains a list of buildings that would be affected by the projects, their years of construction, and their potential for ACMs and LBP to be present.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the KC-46A MOB 1 scenario at McConnell AFB, and long-term benefits from removal of toxic substances are anticipated.

4.4.9.5 Hazardous Waste Management

McConnell AFB would continue to generate hazardous wastes during various operations and maintenance activities. Hazardous waste disposal procedures, including off-base disposal procedures, are adequate to handle changes in quantity and would remain the same. Hazardous

waste anticipated to be generated by the KC-46A MOB 1 scenario would be consistent with waste generated by the KC-135. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. Operations involving hexavalent chromium, cadmium, and halon (i.e., an ODS) have been eliminated or minimized to the extent possible (Boeing 2013). Hazardous materials such as TCE have available alternates and will not be required for the KC-46A. No new hazardous materials would be added that exceed McConnell AFB's current hazardous waste processes.

4.4.9.6 Environmental Restoration Program

Modifications and/or additions to existing buildings for the MOB 1 scenario at McConnell AFB under the proposed action would occur in proximity to existing ERP sites. The USAF would coordinate with the restoration office before any modifications are initiated. Although formal construction waivers are not required, the USAF does require reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current EIAP processes, as specified in AFI 32-7061.

The USAF would ensure that modifications are coordinated with ongoing remediation or investigation activities at any ERP site. However, if existing plans and standard practices are followed, there would be no anticipated impacts on these ERP sites. During C&D activities, there is the potential to encounter contaminated soil and groundwater in areas associated with ERP sites. There is also the possibility that undocumented contaminated soils from historical fuel spills may be present. If encountered, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable Federal, state, and local regulations; AFIs; and base policies. If soil or groundwater contaminants are encountered during C&D activities, health and safety precautions, including worker awareness training, may be required. Construction of utility corridors within previously disturbed areas would help minimize impacts.

Implementation of the MOB 1 scenario at McConnell AFB would require the demolition of Buildings 977, 978, 984, 985, and 1102 to construct a fuel cell, corrosion control, and maintenance hangar. The proposed construction area between Buildings 977, 985, and 1102 is located over ERP site OWS 545 (former Building 980), which has multiple contaminant sources consisting of surface spills and releases from a former OWS (removed in 2006). Soils and groundwater have been impacted by heavy petroleum products, fuels, and VOCs (mostly TCE) (McConnell AFB 2013c). According to the Management Action Plan, there are no limitations on construction for site OW545. There are nine groundwater monitoring wells (B980-MW1, B980-MW3 through B980-MW8, B980-MW10, and B980-MW14) within the proposed construction area that may need to be abandoned and replaced.

ERP site SS003 has a VOC plume (TCE, cis-1,2-dichloroethene, and gasoline range organics), presumably from a leaking OWS, that appears to be located over the southern extent of the proposed new fuel line. There are four groundwater monitoring wells (SS03-MW3, SS03-MW4, SS03-MW11, and SS03-MW18) within the proposed construction area that may need to be abandoned and replaced.

ERP site SS001 also has benzene and TCE plumes just north and east of the proposed fuel cell and corrosion control maintenance hangar.

The depth to groundwater is generally 20 to 30 feet bgs across McConnell AFB (Knight 2013). There are no prohibitions regarding subsurface excavation. Groundwater at these depths is not anticipated to be encountered during C&D activities.

4.4.10 Socioeconomics

4.4.10.1 FTU Scenario Socioeconomics Consequences

4.4.10.1.1 Population

The current personnel at McConnell AFB and the projected changes anticipated to support the KC-46A FTU scenario are provided in Table 2-16. Implementation of the FTU scenario would potentially add up to 570 people to Sedgwick County, resulting in an approximate 0.2 percent county population increase. This potential increase is based on the assumption that the 315 DoD civilians, 20 part-time Reservists, and 23 contractors would be from Sedgwick County.

4.4.10.1.2 Economic Activity (Employment and Earnings)

As shown in Table 2-16, the FTU scenario at McConnell AFB would increase the work force assigned to McConnell AFB by 679 total personnel. The personnel would comprise 141 full-time military, 200 students, 315 DoD civilians, and 23 contractors. The addition of 679 people to McConnell AFB would increase on-base jobs from 4,358 to 5,037, or an approximate 15.6 percent increase. The IMPLAN model calculates that approximately 375 indirect and induced jobs in the ROI would result from implementation of the FTU scenario, with most of the jobs being created in industries such as food services, private hospitals, and real estate establishments. With a 2012 unemployment rate of 6.9 percent, it is expected that the local labor force would be sufficient to fill these new jobs without a migration of workers into the area.

Construction activities, in general, provide economic benefits to the surrounding areas through the employment of construction workers, as well as the purchase of materials and equipment. These construction activities would be temporary and would only provide a limited amount of economic benefit. For every $100 million spent on construction of other new nonresidential structures in the ROI, an estimated 1,309 direct, indirect, and induced jobs would be created (MIG 2012). The USAF estimates that approximately $154 million in construction and $16 million in O&M expenditures would be required to implement the FTU scenario at McConnell AFB. The total amount of construction and O&M expenditures could generate approximately 2,234 jobs primarily within the construction industry or related industries, including architectural, engineering and related services, food services, private hospitals, and real estate establishments (MIG 2012). Since the construction activities are scheduled over several years and it would be possible for a single worker to work on multiple projects, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs. The indirect and induced income associated with construction expenditures is estimated to be approximately $36 million. These jobs, and the related income, would be temporary during the construction activity.

4.4.10.1.3 Housing

Under the assumptions that only DoD civilians, part-time Reservists, and contractors would be from the local population (as stated in Section 4.4.10.1.1) and that all incoming full-time military personnel would require housing off base, there would be a potential need for 141 off-base housing units. Under these assumptions and based on the number of vacant homes described in Section 3.4.10.1.3, the housing market in the ROI would be anticipated to support this need.

All 200 projected pilot and boom operator/loadmaster students, while assigned to the FTU, would be assumed to be in transient status. It would be assumed that 180 of these 200 students would be lodged in either on- or off-base facilities as available. Only 20 of these 200 students would be assumed to be non-prior service Airmen, and therefore would be required to live in an on-base dormitory. Therefore, under the FTU scenario at McConnell AFB, there would be a potential need

for 180 lodging units either on or off base and 20 dormitory units on base to support the average daily student load of 200. Based on the current and projected capacities of both on- and off-base lodging and on-base dormitories, there are adequate facilities available to support the 200 students. However, prior to implementing the FTU scenario, an HRMA would be required to determine the number of suitable and available housing units within the HRMA-defined market area (20 miles or one-hour commute drive from the base gate, whichever is shorter).

4.4.10.1.4 Education

As shown in Table 2-16, the overall change in the number of military dependents and family members accompanying additional USAF personnel associated with the FTU scenario would be approximately 229 people. The total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time military personnel only. The total number of children was estimated at 1.5 times 65 percent of full-time military personnel, since it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 137 military dependents would be anticipated to be of school age. These students would attend any of the 10 public school districts in the county. The students entering the local schools would be of varying ages and would be expected to live in different parts of Sedgwick County. Space available for new enrollments depends on the timing of the relocation and which schools the students would attend. A large influx of students over a short period could result in capacity constraints and could require additional personnel.

4.4.10.1.5 Public Services

Sedgwick County represents a large community with police, fire, and other services. The addition of approximately 570 people would represent less than a 0.2 percent increase of the existing population in Sedgwick County. That increase would not be expected to affect police, fire, or other public services.

4.4.10.1.6 Base Services

Base services such as medical facilities, dining facilities, recreation and fitness centers, and youth and family services have adequate infrastructure and staffing to support the incoming personnel that would be associated with the FTU scenario.

4.4.10.2 MOB 1 Scenario Socioeconomics Consequences

4.4.10.2.1 Population

The current personnel at McConnell AFB and the projected change anticipated to support the MOB 1 scenario are provided in Table 2-19. Implementation of the MOB 1 scenario would result in a decrease of 291 people within Sedgwick County (approximately 0.1 percent of the county population). This potential decrease is based on the assumption that the DoD civilians, part-time Reservists, and contractors would be from Sedgwick County.

4.4.10.2.2 Economic Activity (Employment and Earnings)

As shown in Table 2-19, implementation of the MOB 1 scenario at McConnell AFB would decrease the work force assigned to McConnell AFB by 77 personnel after taking into consideration the manpower decrease associated with the KC-135 drawdown. The personnel would comprise a decrease of 111 full-time military, an increase of 14 DoD civilian, and an increase of 20 contractors. The loss of 77 personnel associated with the KC-135 drawdown

would decrease on-base jobs from 4,358 to 4,281, or an approximate 1.8 percent decrease. The IMPLAN model calculates that approximately 43 indirect and induced jobs in the ROI would be lost with implementation of the MOB 1 scenario, with most of the job loss in industries such as food services, private hospitals, and real estate establishments.

Construction activities, in general, provide economic benefits to the surrounding areas through the employment of construction workers, as well as the purchase of materials and equipment. These construction activities would be temporary and would only provide a limited amount of economic benefit. For every $100 million spent on construction of other new nonresidential structures in the ROI, an estimated 1,309 direct, indirect, and induced jobs would be created (MIG 2012). The USAF estimates that approximately $264 million in construction expenditures would be associated with implementing the MOB 1 scenario at McConnell AFB. This amount could generate approximately 3,455 jobs primarily within the construction industry or related industries, including architectural and engineering services, food services, and private hospitals (MIG 2012). Since the construction activities are scheduled over several years and it would be possible for a single worker to work on multiple projects, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs without a migration of workers into the area. The indirect and induced income associated with construction expenditures is estimated to be approximately $55 million. These jobs, and the related income, would be temporary during the construction activity.

4.4.10.2.3 Housing

The housing market in the ROI is anticipated to have the necessary housing units to support implementation of the replacement KC-46A MOB 1 scenario. This is based on the KC-135 drawdown of 1,920 full-time military personnel relative to the anticipated 1,809 full-time incoming military personnel associated with the MOB 1 scenario. Again, this analysis is based on the assumption that the DoD civilians, part-time Reservists, and contractors would be from Sedgwick County (as stated in Section 4.4.10.2.1). In addition, the MOB 1 scenario includes the construction of a new 75-unit Visiting Quarters, which would provide sufficient capacity for temporary-duty personnel. However, prior to implementing the MOB 1 scenario, an HRMA would be required to determine the number of suitable and available housing units within the HRMA-defined market area (20 miles or one-hour commute drive from the base gate, whichever is shorter).

4.4.10.2.4 Education

As shown in Table 2-19, after considering the incoming military dependents associated with the MOB 1 scenario and the departing military dependents associated with the KC-135 drawdown, there would be an approximate overall decrease of 180 military dependents and family members. The total number of school-aged children was estimated at 1.5 times 65 percent of full-time military personnel only for both the KC-46A incoming and the KC-135 drawdown personnel. Therefore, approximately 108 students would be anticipated to leave any of the 10 public school districts within Sedgwick County.

4.4.10.2.5 Public Services

Sedgwick County represents a large community with police, fire, and other services. The change in USAF-related personnel and dependents would represent less than a 0.1 percent decrease of the existing population in Sedgwick County. That decrease would not be expected to affect police, fire, or other services.

4.4.10.2.6 Base Services

Base services such as medical facilities have adequate capacity to support the proposed MOB 1 scenario. Due to the transition of mission from the KC-135 to the KC-46A, base services have sufficient capacity in the CDC, housing, fitness, and dining facilities to support the incoming personnel.

4.4.11 Environmental Justice and the Protection of Children

4.4.11.1 FTU Scenario Environmental Justice and the Protection of Children Consequences

Implementation of the FTU scenario would result in a 3 percent increase in minority population exposure to noise levels between 65 and 69 dB DNL and a 1 percent increase in low-income population exposure to these same noise levels over the baseline noise currently being experienced at McConnell AFB (see Table 4-30). Because these increases are anticipated to be 3 percent or less over baseline, no disproportionate impacts to off-base populations of minorities, low-income persons, or children are anticipated to result from implementation of the FTU scenario at McConnell AFB.

Table 4-30. Percentage of Off-Base Population Potentially Exposed to Noise Levels of 65 dB DNL or Greater for McConnell AFB

Scenario	Percentage Minority		Percentage Low-Income		Percentage Children (Under 18)	
	65–69 dB DNL	70–74 dB DNL	65–69 dB DNL	70–74 dB DNL	65–69 dB DNL	70–74 dB DNL
FTU	51%	24%	18%	22%	27%	16%
MOB 1	20%	0%	21%	0%	19%	0%
Baseline (Existing Conditions)	48%	24%	17%	22%	29%	16%
Region of Comparison	30%		14%		27%	

4.4.11.2 MOB 1 Scenario Environmental Justice and the Protection of Children Consequences

As shown on Figure 4-6, the 65–69 dB DNL noise contour resulting from the MOB 1 scenario is completely contained inside the baseline noise contour and the analysis indicates that off-base populations of minorities, low-income persons, and children would not be exposed to noise levels above what is occurring under the baseline conditions (see Table 4-30). However, this table indicates a 4 percent increase in the percentage of low-income populations exposed to the 65–69 dB DNL contour. This difference is not an increase in the number of low-income people, but a difference in the proportion of this population exposed to this level of noise.

4.5 NO ACTION ALTERNATIVE

Analysis of the No Action Alternative provides a benchmark, enabling decision makers to compare the magnitude of the environmental effects of the proposed action or alternatives. Section 1502.14(d) of NEPA requires an EIS to analyze the No Action Alternative. No action for this EIS means that the KC-46A beddown would not occur at any base at this time. The No Action Alternative would not establish the KC-46A FTU and associated aircraft and it would not establish the KC-46A MOB 1 and associated aircraft. There would be no changes in base aircraft or personnel assigned to the KC-135 aircraft squadrons. No KC-46A aircraft would arrive, and all existing aircraft would remain in place. No KC-46A personnel changes or construction, renovation, or demolition activities would occur.

The No Action Alternative has been carried forward in the EIS per CEQ regulations and as a baseline of existing impact continued into the future against which to compare impacts of the action alternatives.

Evaluation of the No Action Alternative compares the effects of implementing the KC-46A FTU and MOB 1 scenarios with the effects of the No Action Alternative at each base and for each resource area.

Under the No Action alternative:

- There would be no change in based aircraft at Altus AFB; operations at Altus AFB would continue as described for baseline conditions. The 97 AMW would continue to fly the training mission with a PAA of 18 KC-135 aircraft and the personnel described under baseline conditions.
- There would be no change in based aircraft at Fairchild AFB and aircraft operations would continue as described for baseline conditions. The 92 ARW would continue to fly aerial refueling missions with a PAA of 30 KC-13 aircraft. In addition, the SERE, JPRA, and KC-135 WIC missions would continue.
- There would be no change in based aircraft at Grand Forks AFB; existing RPA operations at Grand Forks AFB would continue as described for baseline conditions. The 319 ABW would continue their base operating and direct operation support mission as described under baseline conditions.
- There would be no change in based aircraft at McConnell AFB; operations at McConnell AFB would continue as described for baseline conditions. The 22 ARW would continue to fly the aerial refueling mission with a PAA of 44 KC-135 aircraft and the personnel described under baseline conditions.

Impacts of the implementation of the No Action Alternative on each resource area evaluated in this Final EIS are described below.

4.5.1 Noise

Under the No Action Alternative, baseline conditions at each base would remain as described in Chapter 3 Noise sections. No changes would occur to the noise levels surrounding each base and the noise contours would remain as they are today. As no construction would occur, no noise associated with construction activities would result from the implementation of this alternative. Impacts under the No Action Alternative would be negligible.

4.5.2 Air Quality

Under the No Action Alternative, baseline conditions at each base would remain as described in Chapter 3 Air Quality sections. No changes would occur. No construction emissions would occur and operational emissions would be identical to the current baseline conditions. Impacts under the No Action Alternative would be negligible.

4.5.3 Safety

Under the no action alternative, baseline conditions at each of base would remain as described in the Chapter 3 Safety sections. No additional impacts would occur to ground or flight safety.

4.5.4 Soils and Water

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Soils and Water sections. None of the KC-46A proposed construction would occur and no impacts on soil and water resources would occur.

4.5.5 Biological Resources

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Biological Resources sections. No vegetation or wildlife habitat would be disturbed as a result of implementing either of the KC-46A scenarios. No additional impacts on biological resources would be anticipated.

4.5.6 Cultural Resources

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Cultural Resource sections. No additional impacts on historical buildings or other cultural resources would occur.

4.5.7 Land Use

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Land Use sections. No changes would occur to planning noise contours surrounding the bases and no land use changes would occur within the base boundaries.

4.5.8 Infrastructure

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Infrastructure sections. No new construction would occur and no new personnel would arrive or decrease at any of the bases. No additional impacts on the infrastructure system at any of the bases would occur.

4.5.9 Hazardous Materials and Waste

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Hazardous Materials and Waste sections. Each base would continue to use hazardous materials and dispose of hazardous waste as described for each base’s baseline conditions.

4.5.10 Socioeconomics

Under the No Action Alternative, baseline conditions would remain as described in the Chapter 3 Socioeconomics sections for each base. No new personnel increases or decreases would occur at

any of the bases and none of the bases would receive the benefits of a population increase. No construction would occur and therefore no construction related beneficial expenditures would occur.

4.5.11 Environmental Justice and the Protection of Children

Under the No Action Alternative, baseline conditions at each base would remain as described in the Chapter 3 Environmental Justice sections. There would be no environmental justice impacts or impacts on populations of children at any of the bases.

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CHAPTER 5

CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis in an Environmental Impact Statement (EIS) should consider the potential environmental consequences resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 *Code of Federal Regulations* [CFR] 1508.7).

Actions that have a potential to interact with the KC-46A beddown scenarios at each of the four bases are included in this cumulative effects analysis. This approach enables decision makers to have the most current information available so that they can evaluate the range of environmental consequences that would result from the beddown of KC-46A aircraft, infrastructure, and personnel at these locations. Although known construction and upgrades are a part of the analysis contained in this document, potential future requirements of the KC-46A beddown cannot be predicted. As those requirements surface, future National Environmental Policy Act (NEPA) analysis would be conducted, as required.

In this chapter, the U.S. Air Force (USAF) has identified past and present actions in the region of each of the four bases that have been selected as alternatives to host either the Formal Training Unit (FTU) or First Main Operating Base (MOB 1) scenarios. In addition, this analysis also evaluated reasonably foreseeable future actions that are in the planning phase in the regions surrounding Altus Air Force Base (AFB) in Oklahoma, Fairchild AFB in Washington, Grand Forks AFB in North Dakota, and McConnell AFB in Kansas. Although auxiliary airfields have been identified for use by KC-46A aircrews associated with the FTU scenario at Altus and McConnell AFBs, no construction, ground disturbance, or other activities beyond flight operations are proposed for those locations; therefore, cumulative effects are not evaluated for any of the auxiliary airfields.

The assessment of cumulative effects begins with defining the scope of other project actions and the potential interrelationship with the proposed action (CEQ 1997). The scope of the analysis must consider other projects that coincide with the location and timetable of implementation of the proposed KC-46A beddown scenarios at each base. Cumulative effects can arise from single or multiple actions and through additive or interactive processes acting individually or in combination with each other. Actions that are not part of the proposal, but that could be considered as actions connected in time or space (40 CFR 1508.25) (CEQ 1997) could include projects that affect areas on or near any of the four bases identified as alternatives for either the FTU or MOB 1 KC-46A scenarios. This Final EIS analysis addresses three questions to identify cumulative effects:

1. Does a relationship exist such that elements of the proposed action or alternatives might interact with elements of past, present, or reasonably foreseeable actions?
2. If one or more of the elements of the alternatives and another action could be expected to interact, would the alternative affect or be affected by impacts of the other action?
3. If such a relationship exists, does an assessment reveal any potentially significant impacts not identified when the alternative is considered alone?

For the scenarios under consideration to have a cumulatively significant impact on an environmental resource, two conditions must be met. First, the combined impacts of all identified past, present, and reasonably foreseeable projects, activities, and processes on a resource, including the impacts of the proposed action, must be significant. Second, the proposed action

must make a substantial contribution to that significant cumulative impact. Proposed actions of limited scope do not typically require as comprehensive an assessment of cumulative impacts as proposed actions that have significant environmental impacts over a large area (CEQ 2005).

In the sections below, the cumulative significance is based on the context, intensity and timing of the KC-46A FTU and MOB 1 scenarios, as discussed in Chapter 4, related to the past, present, and reasonably foreseeable actions. For each base, a summary of the cumulative effects is provided in a table, followed by a discussion of the resource areas that have potentially significant cumulative effects based on the above evaluation criteria.

5.1 ALTUS AIR FORCE BASE (FTU OR MOB 1) CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1.1 Past, Present, and Reasonably Foreseeable Actions

This section provides decision makers with the cumulative effects of the proposed FTU or MOB 1 scenario at Altus AFB, as well as the incremental contribution of past, present, and reasonably foreseeable actions. Altus AFB has been identified by the USAF as the Preferred Alternative for the FTU scenario but also remains an alternative for the MOB 1 scenario.

Table 5-1 summarizes past, present, and reasonably foreseeable actions within the region that could interact with implementation of the KC-46A FTU or MOB 1 scenario at Altus AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the KC-46A scenarios at Altus AFB. No other actions were identified during the data gathering and field survey phases at Altus AFB for this EIS.

Past activities are those actions that occurred within the geographic scope of cumulative effects that have shaped the current environmental conditions of the project area. Originally named Altus Army Airfield, the base was constructed in 1942, with military personnel and aircraft arriving in 1943. Altus AFB is currently home to the 97th Air Mobility Wing and supports four major units: the 97th Operations Group, the 97th Mission Support Group, the 97th Maintenance Directorate, and the 97th Medical Group (Altus AFB 2009c). For most resource areas, such as soils and water, biological resources, infrastructure, and hazardous materials and waste, the impacts of past actions are now part of the existing environment and are incorporated in the description of the affected environment in Chapter 3.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions at Altus AFB and Associated Region

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions				
General Plan, Altus Air Force Base, Oklahoma (Altus AFB 2003)	Air Education and Training Command, Altus AFB	Present, future	The Altus AFB General Plan provides the Base Commander and other decision makers a picture of Altus AFB's present and future capability to support its mission with its physical assets and delivery systems. It is a concise, stand-alone document, summarizing information from a variety of sources. It serves as a guide for site-specific future development and provides general background information in land use growth patterns. Its illustrative format provides decision makers with an understanding of the character and structure of the base.	Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics
Final Environmental Assessment, General Plan-Based Environmental Impact Analysis Process (Altus AFB2009c)	Air Education and Training Command, Altus AFB	Present, future	The 97 Civil Engineer Squadron at Altus AFB has planned future base development based upon the Capital Improvements Program contained within the current Altus AFB General Plan. The purpose of the proposed and alternative actions is to construct, renovate, demolish, and operate facilities and infrastructure to support current and potential future training levels at Altus AFB and to improve the effectiveness of training; enhance quality of life; replace old, inadequate facilities; and correct current deficiencies. The proposed and alternative actions provide a range of construction, renovation, and demolition projects to support a higher level of planned mission activity.	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics, Environmental Justice and the Protection of Children
Sikorsky Training Academy (Sikorsky 2013)	Sikorsky Aerospace Services	Not applicable	After publication of the Draft EIS this project was cancelled. Text concerning potential cumulative impacts associated with the project has been removed from this Final EIS.	Not applicable

Table 5-1. Past, Present, and Reasonably Foreseeable Actions at Altus AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
State and Local Actions				
City of Altus Comprehensive Plan 2025 (City of Altus 2004)	City of Altus, Oklahoma	Present, future	The Altus Comprehensive Plan provides a framework for long-range planning of Altus and its 3-mile City-County planning area. It provides a broad context in which local decisions may be made to foster a sustainable environment, a prosperous economy, and a high quality of life for all residents. It balances population, housing, and employment growth with the preservation of open space and prime agricultural lands, as well as infrastructure needs.	Land Use, Infrastructure, Socioeconomics
Altus AFB Joint Land Use Study (BD&Co 1999)	City of Altus and Jackson County, Oklahoma	Present, future	The Joint Land Use Study (JLUS) is a collaborative land use planning effort involving a military base and adjacent local governments. The study evaluates the planning rationale necessary to support and encourage compatible land use development surrounding the base. Its purpose is to provide support to sustain and provide flexibility to military missions on the base while guiding the long-term land use needs of the neighboring counties and communities.	Noise, Land Use, Infrastructure, Socioeconomics

5.1.2 Cumulative Effects

This section evaluates the cumulative effects from the past, present, and reasonably foreseeable future actions (see Table 5-1) and the KC-46A scenarios at Altus AFB. Table 5-2 provides a summary of the cumulative effects. As shown in Table 5-2, air quality, safety, biological resources, cultural resources, land use, hazardous materials and waste, and environmental justice and the protection of children are not anticipated to contribute to cumulative effects. Cumulative effects are discussed for noise, soils and water, infrastructure, and socioeconomics.

Table 5-2. Summary of Cumulative Effects for Altus AFB

Resource Area	KC-46A FTU Scenario[a]	KC-46A MOB 1 Scenario	Past, Present, and Foreseeable Actions	Cumulative Effects
Noise	◘	◘	◘	◘
Air Quality	◘	◘	◘	○
Safety	◘	◘	◘	○
Soils and Water	◘	◘	◘	◘
Biological Resources	○	○	◘	○
Cultural Resources	◘	◘	◘	○
Land Use	◘	◘	◘	○
Infrastructure	◘	●	◘	◘
Hazardous Materials and Waste	◘	◘	◘	○
Socioeconomics	○	○	◘	◘
Environmental Justice and the Protection of Children	○	○	◘	○

[a] KC-46A FTU scenario is considered under the Preferred Alternative.

Key: ○ – not affected or beneficial impacts, ◘ – affected but not significant, short to medium term, impacts that range from low to high intensity, ● – significant impacts, that are high in intensity or are long term.

5.1.2.1 Noise

Implementation of the FTU or MOB 1 scenario would incrementally increase noise levels on and near Altus AFB. Noise impacts are described in Section 4.1.1.

Construction and demolition (C&D) activities in the vicinity of the project locations, in combination with C&D activities proposed as part of the Altus AFB General Plan (GP), are expected to result only in short-term intermittent increases in noise levels during that phase of work (Altus AFB 2009c).

Implementation of the proposed action would not be expected to result in any significant cumulative noise effects in combination with other past, present, or reasonably foreseeable actions.

5.1.2.2 Soils and Water

The Altus General Plan Environmental Assessment (GPEA) identified one project (proposed construction activities associated with Runway 17L/35R) that had the potential for minor adverse impacts on floodplains. The GPEA concluded the action would only involve replacing the existing asphaltic cement surface of the runway with granitic concrete. During this activity, the existing elevations and floodplain environment would be preserved, allowing for no impact on the existing floodplain. Any potential impacts on floodplains are not anticipated to be significant and would be reduced to the maximum extent practicable through project design and implementation of environmental protection measures (Altus AFB 2009c). No other projects with potential soils and water impacts were identified at Altus AFB and no cumulative effects associated with soil and water resources are anticipated.

5.1.2.3 Infrastructure

The FTU and MOB 1 scenarios would require additional facility C&D when considered in combination with the Altus AFB GP and the associated impacts identified in the Altus GPEA. The FTU would require the construction of new facilities, renovation/ alteration/additions to existing facilities, and demolition of facilities. The MOB 1 scenario would require more development than the FTU scenario.

The Altus GPEA analyzed a Potential Development Alternative (PDA) that was selected as the preferred alternative for future development at Altus AFB. The PDA represents a broader approach to base and mission development at Altus AFB. Under the PDA, Altus AFB would be developed up to 75 percent of its potential, which is a level substantially higher than the current development. This would equate to the development of approximately 384 acres of on-base land, resulting in approximately 695,538 square feet of additional facility space and 93 acres of additional impervious cover on the base (Altus AFB 2009c).

The potential for cumulative effects associated with conflicts between either of the KC-46A scenarios and proposed Installation Development Plan (IDP) projects at Altus AFB could be off-set by coordinating and including the KC-46A mission in the USAF comprehensive planning process with Air Mobility Command (AMC). Not all of the projects proposed under the PDA are approved or funded and would not be completed in the same timeframe as the projects identified for either of the KC-46A scenarios. The total disturbance area associated with the FTU would be less than five acres, but the total disturbance area associated with the MOB 1 would be less than 80 acres. The impervious surface created as part of the FTU scenario would not be significant, but the impervious surface created for the MOB 1 scenario for aircraft parking could be significant if stormwater controls are not included in project designs and construction plans when included with other proposed base development.

All C&D activities generally would be expected to result in short-term job creation and materials procurement. These types of short-term, construction-related benefits would occur regardless of project location. Sound engineering and management practices would minimize the potential for cumulative effects during and following construction.

5.1.2.4 Socioeconomics

Any present or future actions that would involve an in- or out-migration of people to the area would create a cumulative impact on housing, economic activity (in the form of construction, employment, and earnings), educational facilities and staffing, and public and base services. Construction activities typically provide a beneficial economic impact on the area but are short-term for the duration of the project. However, many short-term projects occurring throughout the years provide a cumulative beneficial economic impact over the long-term.

Regionally, Altus AFB is located in Jackson County adjacent to the City of Altus. These municipalities have comprehensive plans, capital improvement plans, transportation plans, and other plans that guide future development activities, including formal coordination with the base in the form of the Altus AFB Joint Land Use Study (JLUS), approved by the city and county in 1999. In accordance with the JLUS, the communities surrounding Altus AFB seek to avoid encroachment issues with the base through appropriate land use surrounding the base, zoning, building height restrictions, avoiding clear zone (CZ) and accident potential zone (APZ) areas, and minimizing residential and other incompatible development.

The Altus GPEA indicated that the PDA for the new development to support the increase in mission activities would also result in beneficial impacts on the local economy. Socioeconomic

benefits go beyond the direct change in military personnel and have an extended, or multiplier, effect upon regional employment and economic activity. Any new future missions required to support the FTU or MOB 1 scenario would require separate USAF comprehensive planning and NEPA analysis.

No major new or planned development activities were identified in the Altus area that could combine with the KC-46A beddown scenarios to potentially result in cumulative socioeconomic impacts. While it is unknown whether any of these jobs would involve new employees relocating to the Altus area, no significant adverse impacts are expected in combination with the KC-46A FTU or MOB 1 scenario.

5.1.3 Irreversible and Irretrievable Commitment of Resources

The irreversible environmental changes that would result from implementation of the KC-46A FTU or MOB 1 scenario at Altus AFB involve the consumption of material resources and energy resources. The use of these resources is considered to be permanent. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the impacts that use of these resources will have on future generations. Irreversible impacts primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). Irretrievable resource commitments also involve the loss in value of an affected resource that cannot be restored as a result of the action.

For the beddown of KC-46A aircraft at Altus AFB for either the FTU or MOB 1 scenario, most resource commitments are neither irreversible nor irretrievable. Most impacts are short term and temporary, such as air emissions from construction, or longer lasting but negligible, such as the construction of new homes to support new KC-46A personnel increases on base or in the local communities. Those limited resources that could involve a possible irreversible or irretrievable commitment would be used in a beneficial manner.

Construction and renovation of base facilities and infrastructure would require the consumption of limited amounts of material typically associated with interior renovations (wiring, insulation, windows, drywall) and exterior construction (concrete, steel, sand, mortar, brick, asphalt). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost but would be used in an efficient and sustainable manner over the useful life cycle of the facilities.

Training operations would continue to involve the consumption of nonrenewable resources, such as gasoline used in vehicles and jet fuel used in the KC-46A aircraft and other aircraft while in flight. None of these activities are expected to significantly decrease the availability of minerals or petroleum resources. Personal vehicle use by the new personnel and those continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase slightly; however, this additional use is not expected to significantly affect the availability of the resources in the southwestern Oklahoma region or nationally.

5.2 FAIRCHILD AIR FORCE BASE (MOB 1) CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.2.1 Past, Present, and Reasonably Foreseeable Actions

This section provides decision makers with the cumulative effects of the proposed KC-46A MOB 1 scenario at Fairchild AFB, as well as the incremental contribution of past, present, and reasonably foreseeable actions.

Table 5-3 summarizes past, present, and reasonably foreseeable actions within the region that could interact with the implementation of the KC-46A MOB 1 scenario at Fairchild AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the proposed KC-46A MOB 1 scenario. No other actions were identified during the data gathering and field survey phases at Fairchild AFB for this EIS.

Past activities are those actions that occurred within the geographic scope of cumulative effects that have shaped the current environmental conditions of the project area. Fairchild AFB was constructed in 1942 and named the Spokane Air Depot while it served as a repair depot for damaged aircraft during World War II. The base has increased more than three times in size since its initial construction, and the facilities and infrastructure have undergone several major periods of construction and reconstruction to accommodate student training loads and new missions and commands (USAF 2012b). For most resource areas, such as soils and water, biological resources, infrastructure, and hazardous materials and waste, the impacts of past actions are now part of the existing environment and are incorporated in the description of the affected environment in Chapter 3.

Table 5-3. Past, Present, and Reasonably Foreseeable Actions at Fairchild AFB and Associated Region

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions				
Fairchild AFB General Plan 2010 (currently in the process of being updated to an Installation Development Plan in accordance with revised USAF Comprehensive Planning guidelines) (Fairchild AFB 2010a)	Air Mobility Command, Fairchild AFB	Present, future	The Fairchild GP has been developed to provide a strategy for the continued physical development of Fairchild AFB in support of the base's current air refueling mission and prospective additional missions. The GP provides a vision for future development of the base and considers creative solutions, as well as forthcoming challenges. It is a stand-alone document prepared to respond to the USAF's commitment to planning for future and sustainable development and protecting the environment.	Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics
Final Environmental Assessment of Installation Development at Fairchild Air Force Base, Washington (2013) (USAF 2012b)	Air Mobility Command, Fairchild AFB	Present, future	Fairchild AFB seeks to improve its understanding of the potential environmental consequences associated with the continuing base development process. The proposed action is to implement a range of selected projects, such as demolition of aging facilities, new facility construction, facility upgrades, facility repair and renovation, utilities upgrades, community living upgrades, infrastructure improvements, recreational upgrades, natural infrastructure management, and strategic sustainability performance projects, that would be among those proposed to be completed or implemented during the next 5 years (from Fiscal Year 2013 to Fiscal Year 2018).	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics, Environmental Justice and the Protection of Children
Environmental Assessment, Demolition of Hangars, Fairchild Air Force Base, Washington (2012) (Fairchild AFB 2012d)	Air Mobility Command, Fairchild AFB	Present, future	The purpose of the proposed action is to comply with a USAF Headquarters directive, requiring bases to "reduce their physical infrastructure by 20 percent by 2020." Fairchild AFB is working toward this goal by finding excess space that is not economical to restore for other purposes and programming it for demolition. The proposed action will demolish 5 hangars on the airfield, leaving 18 hangars in place. The current missions at Fairchild AFB are authorized 7 hangars, so the proposed action would demolish 5 and leave 11 excess hangars on the airfield for future phases of demolition.	Cultural Resources, Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste
Environmental Assessment, Demolition of Munitions Area Storage Facilities, Fairchild AFB, Washington (Fairchild AFB 2011h)	Air Mobility Command, Fairchild AFB	Present, future	The purpose of this action is to demolish six facilities in the Munitions Storage Area at Fairchild AFB. These facilities were constructed between 1952 and 1956. Currently, these facilities are not considered mission critical and are empty or underutilized. The unique construction and infrastructure of these facilities, as well as their location in a limited access area, would make it difficult to rehabilitate or renovate these facilities for another purpose.	Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste
Environmental Assessment, Expansion of RV Storage Lot, Fairchild AFB, Washington (Fairchild AFB 2011i)	Air Mobility Command, Fairchild AFB	Present, future	The purpose of this action is to provide more parking to the RV Storage Lot, run -by Recreational Services. This service provides nearby parking of RVs for Airmen at Fairchild AFB at a lower rate than in the local area. The RV Storage Lot is located on the northwest side of Fairchild AFB behind the Petroleum, Oil, and Lubricants storage area.	Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste

Table 5-3. Past, Present, and Reasonably Foreseeable Actions at Fairchild AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Non-Military Federal Actions				
Final Environmental Impact Statement, Spokane Tribe of Indians, West Plains Casino and Mixed-Use Development Project, City of Airway Heights, Spokane County, Washington (BIA 2013)	Bureau of Indian Affairs (BIA) and the Spokane Tribe of Indians	Future	The EIS has been prepared by the BIA as the lead Federal agency pursuant to the National Environmental Policy Act to assess the environmental effects of issuing a two-part determination under Section 20 of the Indian Gaming Regulatory Act (proposed action), and the subsequent proposed development discussed below. The purpose of the proposed action is to advance the BIA's "Self Determination" policy of promoting the tribe's self-governance capability, and to promote opportunities for economic development and self-sufficiency of the tribe and its members. The USAF was a cooperating agency in the development of the EIS. The Spokane Tribe of Indians is in the planning stages of developing the West Plains Casino and Mixed-Use Development Project. The tribe has identified a 145-acre site held in Federal Trust for the tribe in the City of Airway Heights, Spokane County, Washington. The proposed project site is located immediately northwest of the intersection of U.S. Highway 2 (U.S. 2) and Craig Road. The site is located approximately 1.5 miles east of the main entrance gate of Fairchild AFB on U.S. 2. The proposed project consists of the development of a casino-resort facility, a 300-room hotel, parking structure, site retail, commercial building, tribal cultural center, and police/fire station within the project site. Access to the project site would be provided along U.S. 2 and Craig Road. The project has been coordinated with the USAF. The Spokane Tribe of Indians has enacted the West Plains Development Code to implement recommendations of a JLUS to avoid incompatible development in the vicinity of Fairchild AFB. This code includes restrictions and requirements for building heights, density, sound attenuation, wildlife attractants, light and glare.	Infrastructure, Socioeconomics

Table 5-3. Past, Present, and Reasonably Foreseeable Actions at Fairchild AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
State and Local Actions				
Fairchild Air Force Base Joint Land Use Study (JLUS) (2009) (Spokane County 2009)	Spokane County, Washington	Present, future	The JLUS is a collaborative land use planning effort involving a military base and adjacent local governments. The study evaluates the planning rationale necessary to support and encourage compatible land use development surrounding the base. Its purpose is to provide support to sustain and provide flexibility to military missions on the base while guiding the long-term land use needs of the neighboring counties and communities.	Noise, Land Use, Infrastructure, Socioeconomics
Spokane Metropolitan Planning Area 2011–2035 Metropolitan Transportation Plan (City of Spokane 2012)	City of Spokane, Washington Spokane Regional Transportation Council	Present, future	The Metropolitan Transportation Plan is a long-range, multimodal plan that provides a blueprint to address transportation issues and needs through the year 2035. All major transportation modes are incorporated into the plan, including highways and streets, public transportation, airports, freight and goods movement, and bicycle and pedestrian transportation.	Land Use, Infrastructure, Socioeconomics
Washington State Department of Transportation 2012–2015 State Transportation Improvement Program (WA DOT 2012)	Washington State Department of Transportation	Present, future	The 2012–2015 State Transportation Improvement Program is a 4-year, fiscally constrained prioritized program of transportation projects, compiled from local and regional plans, along with the Washington Transportation Plan. These projects have been identified through state, regional, and local planning processes as the highest priority for the available funding to preserve and improve the state's transportation network.	Land Use, Infrastructure, Socioeconomics

5.2.2 Cumulative Effects

This section evaluates the cumulative effects from the past, present, and reasonably foreseeable future actions (see Table 5-3) and the KC-46A scenario at Fairchild AFB. Table 5-4 provides a summary of the cumulative effects. As shown in Table 5-4, air quality, safety, soils and water, biological resources, hazardous materials and waste, and environmental justice and protection of children are not anticipated to contribute to cumulative effects. Cumulative effects are discussed for noise, cultural resources, land use, infrastructure, and socioeconomics.

Table 5-4. Summary of Cumulative Effects for Fairchild AFB

Resource Area	KC-46A MOB 1 Scenario	Past, Present, and Foreseeable Actions	Cumulative Effects
Noise	◘	◘	◘
Air Quality	◘	◘	○
Safety	◘	◘	○
Soils and Water	◘	◘	○
Biological Resources	○	◘	○
Cultural Resources	◘	◘	◘
Land Use	◘	◘	◘
Infrastructure	◘	◘	◘
Hazardous Materials and Waste	◘	◘	○
Socioeconomics	○	◘	◘
Environmental Justice and the Protection of Children	◘	◘	○

Key: ○ – not affected or beneficial impacts, ◘ – affected but not significant, short to medium term, impacts that range from low to high intensity, ● – significant impacts, that are high in intensity or are long term.

5.2.2.1 Noise

Under the MOB 1 scenario, noise levels on and near the base would increase slightly. Only short-term, minor, adverse impacts would occur during the construction phase of other military actions identified in Table 5-3. Because the resulting impacts would be low in intensity and short-term, they would not contribute to a significant cumulative effect.

5.2.2.2 Cultural Resources

Fairchild AFB, in coordination with the Washington State Historic Preservation Office (SHPO) (Department of Archaeology and Historic Preservation [DAHP]), developed a Memorandum of Agreement (MOA) for the demolition of flightline structures eligible for listing in the National Register of Historic Places (NRHP). In accordance with the MOA, the USAF would ensure that stipulations listed in the MOA are implemented for demolition of historic structures to mitigate adverse impacts.

As discussed in Chapter 4, implementation of the MOB 1 scenario at Fairchild AFB would adversely impact one building eligible for the NRHP. Fairchild AFB has amended the existing MOA and has agreed to mitigate any adverse impacts created by the demolition of the NRHP-eligible building, should Fairchild AFB be selected for the MOB 1 mission.

Demolition projects proposed along the flightline would contribute to cumulative effects on cultural resources (Fairchild AFB 2012d; USAF 2012b). Although the demolitions would be an adverse effect, completion of actions required by the MOA would minimize the potential for cumulative effects to cultural resources.

5.2.2.3 Land Use

Implementation of the MOB 1 scenario would result in low intensity impacts from increased number of air operations because of existing incompatible residential and unspecified commercial and industrial zoning in the APZs. Continued coordination with local zoning authority to refine land use restrictions in airport overlay district would reduce the potential for cumulative effects therefore there would be no significant cumulative effects on land use.

Encroachment by potentially incompatible land use from the past, present, and reasonably foreseeable future projects (included in Table 5-3) have potential to additionally contribute to cumulative land use impacts. Fairchild AFB would need to continue coordinating with Spokane County, local municipalities, the Spokane Tribe, and developers to adopt planning and zoning regulations that ensure compatibility between local development and the USAF mission and minimize cumulative land use effects.

5.2.2.4 Infrastructure

The new MOB 1 scenario proposed for Fairchild AFB would require additional facility C&D above what was included in the existing Fairchild AFB GP, the associated impacts identified in the Fairchild AFB IDEA, and other recent infrastructure-type NEPA actions proposed for Fairchild AFB in Table 5-3. The projects identified in the Fairchild AFB GP and the other proposed infrastructure projects include new construction, infrastructure improvements, natural infrastructure management, strategic sustainability performance, and demolition of facilities (USAF 2012b). The potential for cumulative effects associated with conflicts between the MOB 1 scenario and proposed IDP projects at Fairchild AFB can be off-set by coordinating and including the proposed mission in the USAF comprehensive planning process with AMC.

All C&D activities generally would be expected to result in short-term job creation and materials procurement. These types of short-term, construction-related benefits would occur regardless of project location and are not constraints to base development or contributions to significant cumulative effects. Sound engineering and management practices would minimize the potential for cumulative effects during and following construction. Additional impervious surface on the base from the proposed Fairchild AFB GP and other infrastructure projects would require appropriate stormwater system improvements.

The personnel increase during the long-term operational phase, as discussed in Chapter 4, would not contribute to significant cumulative effects because the local and regional road network would have sufficient capacity. Traffic associated with implementation of the proposed West Plains Casino and Mixed-Use Development Project has the potential to combine with the construction and mission personnel traffic and could result in the potential for impacts on vehicular transportation roadway network traffic and circulation patterns in the immediate area of the proposed casino development site and Fairchild AFB. The severity of the impacts would depend on the traffic mix of the base and the proposed casino during peak hour periods. The BIA EIS projected that the proposed casino would result in significant cumulative traffic and circulation impacts on roadways and intersections in the forecast year of 2032 without mitigation measures. The impacts would include the potential to impact traffic to and from the base and traffic in general for all base personnel and their dependents. The BIA EIS identified a number of mitigation measures to reduce significant cumulative traffic and circulation impacts. Based on an Intergovernmental Agreement among the Spokane Tribe of Indians, the City of Airway Heights, and Spokane County, the tribe developed a Traffic Impact Analysis that includes a number of roadway and intersection improvement projects to improve traffic capacity, circulation, flow, and efficiency through the maximum casino complex build-out phase in 2019 (BIA 2013).

5.2.2.5 Socioeconomics

Any present or future actions that would involve an in- or out-migration of people to the area would create a cumulative impact on housing, economic activity (in the form of construction, employment, and earnings), educational facilities and staffing, and public and base services. Construction activities typically provide a beneficial economic impact on the area but are short-term for the duration of the project. However, many short-term projects occurring throughout the years provide a cumulative beneficial economic impact over the long-term.

The proposed West Plains Casino and Mixed-Use Development Project has the potential to combine with the KC-46A MOB 1 scenario to result in both beneficial and potential adverse cumulative socioeconomic effects. The BIA EIS estimates that the proposed casino complex would create approximately 2,805 jobs, generate $141.2 million in annual revenues, and attract 2,823,056 patrons annually under full build-out conditions associated with the maximum build alternative (i.e., Alternative 1) (BIA 2013). The KC-46A MOB 1 scenario and the proposed West Plains Casino and Mixed-Use Development Project, in combination, would add substantial new direct and indirect revenue-generating capacity to regional municipalities and Spokane County.

If a large number of relocations were associated with the proposed casino complex, there could be a shortage of suitable housing. Personnel and families associated with the proposed MOB 1 scenario would require on- or off-base housing. However, for the proposed casino complex, it is anticipated that the majority of employees would come from the Spokane County region and that a large relocation of employees would not occur. Therefore, existing housing would be adequate, resulting in no cumulative contribution.

Strategies to minimize cumulative effects to socioeconomics could include implementation of comprehensive plans, capital improvement plans, transportation plans, and other plans that guide future development activities, including formal coordination with the base in the form of a JLUS between the base and Spokane County.

5.2.3 Irreversible and Irretrievable Commitment of Resources

The irreversible environmental changes and irretrievable commitment of resources that would result from implementation of the new scenario at Fairchild AFB would be similar in nature and have similar characteristics to those identified for Altus AFB in Section 5.1.3.

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5.3 GRAND FORKS AIR FORCE BASE (MOB 1) CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.3.1 Past, Present, and Reasonably Foreseeable Actions

This section provides decision makers with the cumulative effects of the proposed KC-46A MOB 1 scenario at Grand Forks AFB, as well as the incremental contribution of past, present, and reasonably foreseeable actions.

Table 5-5 summarizes past, present, and reasonably foreseeable actions within the region that could interact with implementation of the KC-46A MOB 1 scenario at Grand Forks AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources could potentially interact with the proposed new KC-46A MOB 1 scenario at Grand Forks AFB. No other actions were identified during the data gathering and field survey phases at Grand Forks AFB for this EIS.

Past activities are those actions that occurred within the geographic scope of cumulative effects that have shaped the current environmental conditions of the project area. Grand Forks AFB was established in 1954 when the USAF announced plans to build an Air Defense Command fighter-interceptor base in eastern North Dakota. The 2005 Base Realignment and Closure (BRAC) directed the realignment of all KC-135 aircraft to other AFBs. In December 2010, Air Combat Command initiated RQ-4 Global Hawk operations and the 119th Air Base Wing (ABW) initiated MQ-1 Predator operations in fulfillment of the 2005 BRAC recommendation for future operations at Grand Forks AFB (Grand Forks AFB 2010b). For most resource areas, such as soils and water, biological resources, infrastructure, and hazardous materials and waste, the impacts of past actions are now part of the existing environment and are incorporated in the description of the affected environment in Chapter 3.

Table 5-5. Past, Present, and Reasonably Foreseeable Actions at Grand Forks AFB and Associated Region

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions				
FY 2013–FY 2014 Project List, 319th Civil Engineering Center, Grand Forks AFB (Grand Forks AFB 2013a)	Air Mobility Command, Grand Forks AFB	Present, future	The Fiscal Year 2013–Fiscal Year 2014 Project List includes project number, title, status, and programmed amounts for 76 projects.	Infrastructure
Capital Improvements Plan, Grand Forks AFB, Fiscal Year 2014–Fiscal Year 2024 (Grand Forks AFB 2013b)	Air Mobility Command, Grand Forks AFB	Present, future	The Capital Improvements Plan for Grand Forks AFB during FY 2014–FY 2024 includes program, title, and scope for 49 projects.	Infrastructure
Unmanned Aircraft Systems Technology Park and Training Program, Enhanced Use Lease Project at Grand Forks AFB, North Dakota (Grand Forks AFB 2013c)	Grand Forks Base Realignment Impact Committee, University of North Dakota, University of North Dakota Aerospace Foundation, Northland Aerospace Foundation, and Northrup Grumman	Present, future	The Unmanned Aircraft Systems (UAS) technology park would support the base's UAS activities, which are conducted by the USAF, the North Dakota Air National Guard, and the U.S. Customs and Border Protection. Northrop Grumman, which has an office in Grand Forks, manufactures the RQ-4 Global Hawk reconnaissance aircraft system, which is flown from the base. These assets would train in Special Use Airspace (SUA) and utilize R-5401/Camp Grafton South, North Dakota. In order to provide adequate training airspace, new SUA Restricted Areas (RAs) or other suitable airspace as determined by FAA would be established.	Noise, Safety, Land Use, Infrastructure, Socioeconomics
Final Environmental Assessment Addressing the Privatization of Military Family Housing at Grand Forks AFB, North Dakota (Grand Forks AFB 2011d)	Air Mobility Command, Air Force Civil Engineer Center, Grand Forks AFB	Present, future	The purpose of the proposed action is to vest responsibility in a private developer for military family housing at Grand Forks AFB. The need for the proposed action is to provide affordable, quality housing and ancillary facilities to military members and their families through demolition of surplus, inadequate units and renovation of existing family housing units so that they meet current USAF standards. The goal of the Northern Military Housing Privatization Initiative is to provide uniformed services members and their families access to safe, secure, quality, affordable, well-maintained housing in a military community where they choose to live.	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics

Table 5-5. Past, Present, and Reasonably Foreseeable Actions at Grand Forks AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions (Continued)				
Final Environmental Assessment of Installation Development at Grand Forks AFB, North Dakota (Grand Forks AFB 2010b)	Air Mobility Command, Grand Forks AFB	Present, future	The 319th Air Refueling Wing (ARW) at Grand Forks AFB seeks to improve its understanding of the potential environmental consequences associated with the continuing base development process. The proposed action is to implement a range of selected projects, such as demolition of aging facilities, new facility construction, facility upgrades, facility repair and renovation, utilities upgrades, community living upgrades, infrastructure improvements, recreational upgrades, natural infrastructure management, and strategic sustainability performance projects that would be among those proposed to be completed or implemented during the next 5 years (from Fiscal Year 2010 to Fiscal Year 2014).	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics, Environmental Justice and the Protection of Children
Final Environmental Impact Statement for the Base Realignment and Closure Beddown and Flight Operations for Remotely Piloted Aircraft at Grand Forks AFB, North Dakota (USAF 2010c)	Air Mobility Command, Grand Forks AFB	Present, future	The EIS analyzes the potential environmental consequences of a proposal to beddown, or locate, remotely piloted aircraft (RPA) at Grand Forks AFB. These assets would train in SUA and utilize R-5401/Camp Grafton South, North Dakota. To provide adequate training airspace, new SUA Restricted Areas would be established.	Noise, Safety, Land Use, Hazardous Materials and Waste, Socioeconomics
Final Environmental Assessment, Proposed Demolition of 35 Buildings Within the Munitions Storage Area at Grand Forks AFB, North Dakota (Grand Forks AFB 2008c)	Air Mobility Command, Air Force Civil Engineer Center, Grand Forks AFB	Present, future	The environmental assessment was prepared to evaluate the potential impacts of demolishing 35 buildings within the munitions storage area at Grand Forks AFB in Grand Forks County, North Dakota. The objective of the proposed action is to reduce the amount of funds currently being spent to maintain these vacant and unused buildings, and remove a potential asbestos risk.	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste
Grand Forks AFB, North Dakota General Plan (GP) (Grand Forks AFB 2006a)	Air Mobility Command, Grand Forks AFB	Present, future	The Grand Forks AFB GP guides base development according to a plan that maximizes economic, physical, and human resources and fulfills those objectives and offers guidelines for enhancing base land use, transportation, and the quality of life. This plan provides decision makers and technical staff with the best possible guidelines for planning, programming, designing, and constructing base facilities to achieve a well-planned and -constructed base. Conscientious planning ensures efficient use of resources and promotes mission success.	Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics

Table 5-5. Past, Present, and Reasonably Foreseeable Actions at Grand Forks AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions (Continued)				
Final Environmental Assessment, Demolition of Alpha Ramp at Grand Forks AFB, North Dakota (Grand Forks AFB 2006c)	Air Mobility Command, U.S. Army Corps of Engineers, Grand Forks AFB	Present, future	This environmental assessment was prepared to remove the A-Ramp facilities and infrastructure that are no longer needed; to remove excess buildings and utilities that represent sources of potential contamination; and to remove excess buildings and facilities (including walls) that are in the 7:1 flight envelope, clear zone, and 50:1 approach-departure clearance zone and require flightline waivers.	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Hazardous Materials and Waste
Non-Military Federal Actions				
Proposed Action and Air Force Form 813 to relocate CBP personnel and aircraft from Grand Forks International Airport to Grand Forks AFB (Grand Forks AFB 2013d)	Department of Homeland Security, Customs and Border Protection	Future	The U.S. Department of Homeland Security Customs and Border Protection (CBP) has submitted a basing action request to relocate 2 aircraft (1 fixed-wing/ 1 rotary wing) and approximately 24 additional personnel from Grand Forks International Airport to Grand Forks AFB. The current CBP tenant mission is located in Building 541 and includes approximately 32 personnel and use of the MQ-9 Reaper to patrol the northern border.	Noise, Air Quality, Safety, Infrastructure
State and Local Actions				
Center to Grand Forks 345 kV Transmission Line Project, Minnkota Power Cooperative, Inc. (MPC 2013)	Minnkota Power Cooperative, Inc.	Present, future	Minnkota Power Cooperative, Inc. has started construction on a new transmission line to meet long-term load growth needs. The Center to Grand Forks Project helps to address the long-standing need to improve voltage support in the northern Red River Valley region. The project consists of approximately 250 miles of new, high-voltage (345-kV) alternating current transmission line from the existing Center 345-kV substation at the Milton R. Young Station located about 4.5 miles southeast of the town of Center, N.D., in Oliver County, to the existing Prairie substation located on the western boundary of the City of Grand Forks, N.D., in Grand Forks County.	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics

Table 5-5. Past, Present, and Reasonably Foreseeable Actions at Grand Forks AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
State and Local Actions (Continued)				
City of Grand Forks, North Dakota, Year 2040 Land Use Plan (City of Grand Forks 2011)	City of Grand Forks, North Dakota	Present, future	The Year 2040 Land Use Plan is an update to previous plans. The plan addresses Grand Forks' jurisdictional area in the form of specific land use goals and policies. The goals and policies provide the framework that can be utilized to guide the physical growth of Grand Forks through the next three decades. Also included in the plan is a map depicting the physical growth of the city by the land use types to the year 2040. The entire Year 2040 Land Use Plan includes six sections: Existing Community; Existing Land Use; Goals, Objectives and Policies; Future Land Use; Urban Design; and Land Use and the Implementation Program.	Land Use, Infrastructure, Socioeconomics
Grand Forks-East Grand Forks, 2035 Long-Range Transportation Plan (GFMPO 2007)	Grand Forks-East Grand Forks Metropolitan Planning Organization	Present, future	The Long-Range Transportation Plan is a long-range, multimodal plan that provides a blueprint to address transportation issues and needs through the year 2035. All major transportation modes are incorporated into the plan, including highways and streets, public transportation, airports, freight and goods movement, and bicycle and pedestrian transportation.	Land Use, Infrastructure, Socioeconomics
Grand Forks-East Grand Forks, Transportation Improvement Program, North Dakota Side, Fiscal Years 2013–2016 (GFMPO 2013)	Grand Forks-East Grand Forks Metropolitan Planning Organization	Present, future	The Final North Dakota Side Transportation Improvement Program (TIP) for the Grand Forks-East Grand Forks area lists the significant transportation system improvements to be implemented during the next 4 years. The 2013–2016 TIP is submitted under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.	Land Use, Infrastructure, Socioeconomics
North Dakota Department of Transportation 2012–2015 State Transportation Improvement Program (NDDOT 2012)	North Dakota Department of Transportation	Present, future	The 2012–2015 State Transportation Improvement Plan is a 4-year, fiscally constrained prioritized program of transportation projects, compiled from local and regional plans, along with the North Dakota Transportation Plan. These projects have been identified through state, regional, and local planning processes as the highest priority for the available funding to improve the state's transportation network.	Land Use, Infrastructure, Socioeconomics
North Dakota State Rail Plan, Upper Great Plains Transportation Institute, North Dakota Department of Transportation (NDDOT 2007)	Upper Great Plains Transportation Institute, North Dakota Department of Transportation	Present, future	This document is an update of the North Dakota State Rail Plan that was published in 1998. It provides information and guidance for state and local officials, rail users, and others affected by railroad transportation and serves as a guide for state investments in eligible rail lines and related projects.	Land Use, Infrastructure, Socioeconomics

5.3.2 Cumulative Effects

This section evaluates the cumulative effects from the past, present, and reasonably foreseeable future actions (see Table 5-5) and the KC-46A scenarios at Grand Forks AFB. Table 5-6 provides a summary of the cumulative effects. As shown in Table 5-6, air quality, safety, soils and water, cultural resources, land use, hazardous materials and waste, and environmental justice and protection of children are not anticipated to contribute to cumulative effects. Cumulative effects are discussed for noise, biological resources, infrastructure, and socioeconomics.

Table 5-6. Summary of Cumulative Effects for Grand Forks AFB

Resource Area	KC-46A MOB 1 Scenario	Past, Present, and Reasonably Foreseeable Actions	Cumulative Effects
Noise	◘	◘	◘
Air Quality	◘	◘	○
Safety	◘	◘	○
Soils and Water	◘	◘	○
Biological Resources	◘	◘	◘
Cultural Resources	○	◘	○
Land Use	◘	◘	○
Infrastructure	◘	◘	◘
Hazardous Materials and Waste	◘	◘	○
Socioeconomics	○	◘	◘
Environmental Justice and the Protection of Children	○	◘	○

Key: ○ – not affected or beneficial impacts, ◘ – affected but not significant, short to medium term, impacts that range from low to high intensity, ● – significant impacts, that are high in intensity or are long term.

5.3.2.1 Noise

The existing noise environment at Grand Forks AFB includes remotely piloted aircraft (RPA) operations (USAF 2010c). The addition of KC-46A aircraft to Grand Forks AFB is not anticipated to result in significant cumulative noise effects.

Noise impacts associated with construction and other actions described in Table 5-5 would be temporary and localized. Although these actions could occur in the same timeframe as actions proposed under the MOB 1 scenario, cumulative noise effects would not be expected to be significant. Other military actions identified in Table 5-5 would have similar contributions to cumulative noise levels.

5.3.2.2 Biological Resources

There is the potential for up to 2 acres of wetlands to be impacted by construction activities associated with the KC-46A MOB 1 scenario. Section 404 and 401 permits and mitigation could potentially be required prior to construction. There is the potential for minor, adverse, cumulative effects on wetlands with other proposed actions in Table 5-5.

- *Final Environmental Assessment of Installation Development at Grand Forks Air Force Base, North Dakota* (Grand Forks AFB 2010b) – This action includes minor, direct adverse impacts on wetlands from the proposed projects to construct base civil engineering pavements and maintenance facility/snow barn and to construct an indoor small arms range. However, potential cumulative effects on wetlands would not be considered significant and would be reduced to the maximum extent practicable through

project design and implementation of environmental protection measures, permits, and coordination with the appropriate Federal and State of North Dakota natural resource agencies.

- *Final Environmental Assessment, Proposed Demolition of 35 Buildings within the Munitions Storage Area* – This action required the taking of 1.3 acres of wetlands that were fully mitigated via a regional wetland bank or at a suitable location on base.
- *Final Environmental Assessment, Demolition of Alpha Ramp* – This action required the taking of 3.9 acres of wetlands that were fully mitigated via a regional wetland bank or at a suitable location on base.

5.3.2.3 Infrastructure

The proposed KC-46A MOB 1 scenario would require additional facility C&D when considered in combination with the existing Grand Forks AFB GP, the associated impacts identified in the Grand Forks IDEA, and the other infrastructure-type NEPA actions at Grand Forks AFB in Table 5-5. The projects identified in the Grand Forks AFB GP and the other proposed infrastructure projects include new construction, infrastructure improvements, natural infrastructure management, strategic sustainability performance, and demolition of facilities (Grand Forks AFB 2010b). The potential for cumulative effects associated with conflicts between the KC-46A MOB 1 scenario and proposed GP projects at Grand Forks AFB can be off-set by coordinating and including the KC-46A MOB 1 scenario in the USAF comprehensive planning process with AMC. Not all of the projects proposed in the GP are approved or funded, and these projects would not be completed in the same timeframe as the projects identified for the KC-46A MOB 1 mission.

All C&D activities generally would be expected to result in short-term job creation and materials procurement. These types of short-term, construction-related benefits would occur regardless of project location and are not constraints to base development or contributions to significant cumulative effects. Sound engineering and management practices would minimize the potential for cumulative effects during and following construction. Additional impervious surface on the base from the proposed Grand Forks AFB GP and other infrastructure projects would require appropriate stormwater system improvements.

Implementation of the KC-46A scenario would result in short-term, impacts during the construction phase that would be avoided or reduced through the use of a construction management plan for vehicle safety, traffic, and circulation. During the long-term operational phase, the MOB 1 scenario would bring 4,526 additional personnel to Grand Forks AFB, most of whom would be military personnel and their dependents. Regional access roads and the on-base road network have adequate capacity to absorb the additional traffic without major impacts on traffic flow, circulation, or level of service for the proposed personnel increase. These short-term and long-term impacts would therefore not significantly contribute to cumulative impacts.

5.3.2.4 Socioeconomics

Any present or future actions that would involve an in- or out-migration of people to the area would create a cumulative impact on housing, economic activity (in the form of construction, employment, and earnings), educational facilities and staffing, and public and base services. Construction activities typically provide a beneficial economic impact on the area but are short-term for the duration of the project. However, many short-term projects occurring throughout the years provide a cumulative beneficial economic impact over the long-term.

Strategies to minimize cumulative effects on socioeconomics could include implementation of comprehensive plans, capital improvement plans, transportation plans, and other plans and coordination efforts that guide future development activities (some of which are included in Table 5-5).

5.3.3 Irreversible and Irretrievable Commitment of Resources

The irreversible environmental changes and irretrievable commitment of resources that would result from implementation of the KC-46A MOB 1 scenario at Grand Forks AFB would be similar in nature and have similar characteristics to those identified for Altus AFB in Section 5.1.3.

5.4 McCONNELL AIR FORCE BASE (FTU OR MOB 1) CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.4.1 Past, Present, and Reasonably Foreseeable Actions

This section provides decision makers with the cumulative effects of the proposed FTU or MOB 1 scenario at McConnell AFB, as well as the incremental contribution of past, present, and reasonably foreseeable actions.

Table 5-7 summarizes past, present, and reasonably foreseeable actions within the region that could interact with implementation of the KC-46A FTU or MOB 1 scenario at McConnell AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the KC-46A scenarios at McConnell AFB. No other actions were identified during the data gathering and field survey phases at McConnell AFB for this EIS.

Past activities are those actions that occurred within the geographic scope of cumulative effects that have shaped the current environmental conditions of the project area. Military operations at Wichita Municipal Airport, which became McConnell AFB, began in the early 1940s; McConnell AFB became a permanent military base in 1953.

Table 5-7. Past, Present, and Reasonably Foreseeable Actions at McConnell AFB and Associated Region

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions				
Proposed Action and AF 813 Form to Demolish Building 1110 and repair HVAC in Buildings 1112 and 1166 (McConnell AFB 2013d)	Air Mobility Command, McConnell AFB	Present, Future	This AF 813 Form recommended a Categorical Exclusion (CATEX) for the demolition of Building 1110. This CATEX was based on a determination that according to 32 CFR Part 989 Appendix B, exclusion A2.3.11 states that "actions similar to other actions which have been determined to have an insignificant impact in a similar setting as established in an EIS or EA resulting in a FONSI." This determination was based on the IDEA conducted in May 2007 examining the demolition of almost 30 buildings, which resulted in a Finding of No Significant Impact. This demolition and heating, ventilation, and air conditioning (HVAC) repair projects were determined to be similar and less likely to result in an environmental impact; therefore, a CATEX was signed.	Noise, Air Quality, Safety, Soils and Water, Cultural Resources, Land Use, Hazardous Materials and Waste
Environmental Impact Statement for the Main Operating Base 2 (MOB 2) for the Beddown of the KC-46A Tanker Aircraft (ANG 2013)	National Guard Bureau, Air National Guard	Present, Future	This EIS is evaluating the potential environmental consequences of various alternatives of bedding down KC-46A tanker aircraft, associated infrastructure, and personnel in support of the MOB 2 at existing Air National Guard (ANG) bases within the continental United States (CONUS). The MOB 2 would consist of one squadron of 12 KC-46A aircraft. The KC-46A would continue supporting the mission of providing worldwide refueling, cargo, and aeromedical evacuation support. The proposed basing alternatives for MOB 2 include: • 190 ARW, Forbes Field, Kansas • 108 Wing, Joint Base McGuire-Dix-Lakehurst, New Jersey • 157 ARW, Pease AGS, New Hampshire • 171 ARW, Pittsburgh AGS, Pennsylvania • 121 ARW, Rickenbacker AGS, Ohio The specific focus of this reasonably foreseeable action is the 190 ARW at Forbes Field, which coincides with both the FTU and MOB 1 scenarios proposed for McConnell AFB. KC-46A aircrews associated with the FTU scenario would also utilize Forbes Field for training exercises. (See Section 2.4.4.2.4, Auxiliary Airfields).	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics, Environmental Justice and the Protection of Children

Table 5-7. Past, Present, and Reasonably Foreseeable Actions at McConnell AFB and Associated Region (Continued)

Action	Proponent/ Location	Timeframe	Description	Resource Interaction
Military Actions (Continued)				
Installation Development Plan, McConnell AFB (McConnell AFB 2011a)	Air Mobility Command, McConnell AFB	Present, future	The McConnell AFB Installation Development Plan (IDP) has been developed to provide a strategy for the continued physical development of McConnell AFB in support of the base's current air refueling mission and prospective additional missions. The IDP provides a vision for future development of the base and considers creative solutions, as well as forthcoming challenges. It is a stand-alone document prepared to respond to the USAF's commitment to planning for future and sustainable development and protecting the environment.	Soils and Water, Land Use, Infrastructure, Hazardous Materials and Waste, Socioeconomics
Final Environmental Assessment of Installation Development at McConnell AFB (USAF 2012e)	Air Mobility Command, McConnell AFB	Present, future	McConnell AFB seeks to improve its understanding of the potential environmental consequences associated with the continuing base development process. The proposed action is to implement a range of selected projects, such as demolition of aging facilities, new facility construction, facility upgrades, facility repair and renovation, utilities upgrades, community living upgrades, infrastructure improvements, recreational upgrades, natural infrastructure management, and strategic sustainability performance projects that would be among those proposed to be completed or implemented during the next 5 years (from Fiscal Year 2012 to Fiscal Year 2017).	Noise, Air Quality, Safety, Soils and Water, Biological Resources, Cultural Resources, Land Use, Infrastructure, Transportation, Hazardous Materials and Waste, Socioeconomics, Environmental Justice and the Protection of Children
State and Local Actions				
McConnell AFB Joint Land Use Study (JLUS) (McConnell AFB 2005)	Cities of Derby and Wichita and Sedgwick County, Kansas	Present, future	The JLUS is a collaborative land use planning effort involving a military base and adjacent local governments. The study evaluates the planning rationale necessary to support and encourage compatible land use development surrounding the base. Its purpose is to provide support to sustain and provide flexibility to military missions on the base while guiding the long-term land use needs of the neighboring counties and communities.	Noise, Land Use, Infrastructure, Socioeconomics
City of Wichita, Kansas Capital Improvement Plan, 2011–2020 (City of Wichita 2009)	City of Wichita, Kansas	Present, future	The Capital Improvement Program budget document provides an overall 10-year plan for capital assets, as well as a 10-year plan to finance those projects. Summary information includes estimated expenditures, revenues, debt service, and total debt.	Land Use, Infrastructure, Socioeconomics
Wichita Transportation Improvement Program (WAMPO 2012)	Wichita Area Metropolitan Planning Organization	Present, future	The Transportation Improvement Program is a short-range program that identifies transportation projects to be implemented in the Wichita Area Metropolitan Planning Organization region from 2012–2016. All projects in this region that use Federal transportation funds and/or have regional significance are required to be included in the Transportation Improvement Plan.	Land Use and Recreation, Infrastructure, Socioeconomics

5.4.2 Cumulative Effects

This section evaluates the cumulative effects from the past, present, and reasonably foreseeable future actions (see Table 5-7) and the KC-46A scenarios at McConnell AFB. Table 5-8 provides a summary of the cumulative effects. As shown in Table 5-8, air quality, soils and water, safety, biological resources, hazardous materials and waste, and environmental justice and protection of children are not anticipated to contribute to cumulative effects.

Table 5-8. Summary of Cumulative Effects for McConnell AFB

Resource Area	KC-46A FTU Scenario	KC-46A MOB 1 Scenario[a]	Past, Present, and Reasonably Foreseeable Actions	Cumulative Effects
Noise	◘	○	◘	◘
Air Quality	◘	◘	◘	○
Safety	◘	◘	◘	○
Soils and Water	◘	◘	◘	○
Biological Resources	○	○	◘	○
Cultural Resources	○	◘	◘	◘
Land Use	◘	◘	◘	◘
Infrastructure	◘	◘	◘	◘
Hazardous Materials and Waste	◘	◘	◘	○
Socioeconomics	○	◘	◘	◘
Environmental Justice and the Protection of Children	◘	◘	◘	○

[a] KC-46A MOB 1 scenario is considered under the Preferred Alternative.

Key: ○ – not affected or beneficial impacts, ◘ – affected but not significant, short to medium term, impacts that range from low to high intensity, ● – significant impacts, that are high in intensity or are long term.

5.4.2.1 Noise

The existing noise environment at McConnell AFB includes KC-135 operations. Implementation of the FTU or MOB 1 scenario at McConnell AFB is not anticipated to result in significant cumulative noise effects.

C&D activities in the vicinity of the proposed project locations, in combination with C&D activities proposed as part of the McConnell AFB IDP, are expected to result only in short-term intermittent increases in noise levels during that phase of work (USAF 2012e). These noise impacts would not be expected to result in significant noise impacts when taken in conjunction with actions taken as part of the KC-46A FTU or MOB 1 scenario.

The National Guard Bureau is preparing a separate EIS that will support an independent decision to beddown 12 KC-46A aircraft at a second MOB (MOB 2). One of the locations being considered for the MOB 2 is Forbes Field (FOE), Kansas. This action is separate and independent from the FTU and MOB 1 actions that will result from this Final EIS; however, this action is considered in cumulative effects as addressed in Table 5-7.

Under the FTU scenario, the active-duty FTU would conduct approximately 977 airfield operations per year at FOE. In the context of the 24,742 airfield operations currently ongoing at FOE, this addition would be expected to result in an increase in day-night average sound level (DNL) of less than 0.2 decibels (dB) (see Volume II, Appendix B, Section B.1.3.2). If the Air National Guard (ANG) were to beddown MOB 2 at FOE, noise from the FTU scenario aircraft operations would be additive to noise generated by MOB 2. KC-46A noise is similar in type and intensity to the aircraft currently operating at FOE. In this context, KC-46A FTU scenario

auxiliary field operations would comprise a small fraction of overall operations. Noise impacts of the KC-46A FTU scenario operations would not be expected to contribute to significant cumulative noise effects at FOE.

5.4.2.2 Cultural Resources

None of the buildings proposed to support the FTU scenario at McConnell AFB are considered eligible for listing on the NRHP, and therefore would not contribute to cumulative effects. Three buildings associated with the MOB 1 scenario are considered eligible for listing on the NRHP: 1106, 1107 and 1218. Demolition of Building 1106 would result in an adverse impact.

The McConnell AFB IDP environmental assessment, as described in Table 5-7, evaluated the proposed action to determine potential impacts to archeological sites, historic facilities or districts, and traditional cultural properties. The projects identified in the environmental assessment would not result in adverse impacts and therefore would not contribute to cumulative cultural resource impacts in combination with the KC-46A FTU or MOB 1 scenarios.

While there are no known future actions that have the potential to contribute to cumulative cultural resource impacts at McConnell AFB, past actions (such as the mitigated demolition of historical structures) have resulted in minor, adverse cultural impacts. These actions taken with the current impacts relating to the KC-46A MOB 1 scenario have a potential to cause minor cumulative effects to cultural resources. McConnell AFB and the Kansas SHPO have signed a MOA agreeing to measures that mitigate the adverse effect on historic properties that would result from selection of McConnell AFB for the MOB 1 scenario. This MOA would also minimize potential cumulative effects.

5.4.2.3 Land Use

Implementation of various plans and projects listed in Table 5-7, in conjunction with the KC-46A scenarios, would result in compatible development within the base. Aircraft operations would continue to affect incompatible development that currently occurs within APZ I and APZ II, resulting in a contribution to cumulative land use impacts. Coordination between McConnell AFB and the Cities of Derby and Wichita would continue to reinforce the goals and strategies outlined in the AICUZ report with the objective to minimize the potential cumulative effects of future development.

The Cities of Derby and Wichita and Sedgwick County, in cooperation with McConnell AFB, would also continue to pursue recommendations presented in the 2005 JLUS report. The JLUS identified several planning areas within which increased coordination and communication among stakeholders and increased levels of land use compatibility guidance were recommended. For example, the JLUS recommended managing growth in CZ and APZ areas through zoning requirements, instituting noise level reduction measures in local building codes, and acquiring land within APZ safety areas to minimize future land use conflicts (USAF 2012e).

5.4.2.4 Infrastructure

The FTU and MOB 1 scenarios would require additional facility C&D when considered in combination with the McConnell AFB IDP and the associated impacts identified in the IDEA. The FTU scenario would require the construction of new facilities, renovation/alteration/additions to existing facilities, and demolition of facilities (see Table 2-15). The MOB 1 scenario would require more construction activity (see Table 2-18) and therefore has a greater potential to contribute to cumulative effects.

The IDP includes projects for new construction, infrastructure improvements, natural infrastructure management, strategic sustainability performance (e.g., solar plant), and demolition of facilities (USAF 2012e). The potential for cumulative effects associated with conflicts between either of the KC-46A scenarios and the proposed IDP projects at McConnell AFB can be off-set by coordinating and including the KC-46A scenario in the USAF comprehensive planning process with AMC. Not all of the projects proposed in the IDP are approved or funded yet, and these projects would not be completed in the same timeframe as the projects identified for either of the KC-46A scenarios.

All C&D activities generally would be expected to result in short-term job creation and materials procurement. These types of short-term, construction-related benefits would occur regardless of project location and are not constraints to base development or contributions to significant cumulative effects. Sound engineering and management practices would minimize the potential for cumulative effects during and following construction. Additional impervious surface on the base from the proposed IDP projects would require installation of appropriate stormwater system improvements.

5.4.2.5 Socioeconomics

Any present or future actions that would involve an in- or out-migration of people to the area would create a cumulative impact on housing, economic activity (in the form of construction, employment, and earnings), educational facilities and staffing, and public and base services. Construction activities typically provide a beneficial economic impact on the area but are short-term for the duration of the project. However, many short-term projects occurring throughout the years provide a cumulative beneficial economic impact over the long-term.

In January 2012, Boeing announced that it will close its Wichita facilities by the end of 2013 (USAF 2012e). Boeing's expansive facilities abut McConnell AFB, and any future uses of those facilities are not known at this time.

Strategies to minimize cumulative effects to socioeconomics could include implementation of comprehensive plans, capital improvement plans, transportation plans, and other plans and coordination efforts that guide future development activities, including coordination with the base.

5.4.3 Irreversible and Irretrievable Commitment of Resources

The irreversible environmental changes and irretrievable commitment of resources that would result from implementation of the KC-46A FTU or MOB 1 scenario at McConnell AFB would be similar in nature and have similar characteristics to those identified for Altus AFB in Section 5.1.3.

CHAPTER 6

DRAFT EIS COMMENT SUMMARY

6.0 DRAFT EIS COMMENT SUMMARY

This chapter contains comments received from tribes; Federal, state, and local agencies; the public; and others during the public review period for the Draft Environmental Impact Statement (EIS). The 45-day Draft EIS public review process began on 25 October 2013 with the publication of the Notice of Availability (NOA) of the Draft EIS in the *Federal Register*. The public review period ended on 9 December 2013.

The U.S. Air Force (USAF) reviewed the comments and they were incorporated, as appropriate, into this Final EIS. The USAF encouraged public participation during the public hearings; through notifications via direct mailings, newspaper advertisements, and press releases; and via the project website.

6.1 COMMENT RECEIPT

All Draft EIS comments, including both written correspondence and oral testimony, were assigned unique comment numbers. These numbers were assigned by base and are listed in numerical order in Volume II, Appendix A, Section A.7.3. The comment numbers are organized using the alpha-numeric system shown in Table 6-1. A number was assigned to every comment received. The first character of the comment number is the first letter of the Air Force Base (AFB) applicable to the comment. If the comment applied to multiple bases, the comment was duplicated for each applicable base. The second set of characters in the numbering system is the running number of each comment. The third set of characters denotes that the comment applies to the Draft EIS, with the letter "W" used to denote comments submitted via the website. The last letter of the numbering system denotes if the commenter was an agency, organization, individual or tribe. All of the comments are included in Volume II, Appendix A, Section A.7.3 (on the CD-ROM attached to the back cover of this Final EIS).

Table 6-1. Draft EIS Comment Numbering System Legend

1. By Base		2. Comment Number	3. Version of EIS		4. Commenter[a]	
A	Altus	**001**	**D**	Draft EIS	**A**	Agency
F	Fairchild	**002**	**DW**	Draft EIS website comment	**O**	Organization
G	Grand Forks	**003…etc**			**I**	Individual
M	McConnell				**T**	Tribe

[a] Comments received from elected officials were recorded as Agency comments.

Two examples of how the comment numbers were assigned are shown below.

Examples:

F_003_D_A = Fairchild AFB, comment #3, Draft EIS comment from an agency.

M_027_D_I = McConnell AFB, comment #27, Draft EIS comment from an individual.

6.2 COMMENT REVIEW

In accordance with 40 *Code of Federal Regulations* (CFR) 1503.4, the USAF carefully considered all comments submitted. As discussed in Section 1.5.2, only substantive comments were responded to in the preparation of this Final EIS.

6.3 GOVERNMENT RESPONSES TO COMMENTS

6.3.1 Locating Comments

A directory of commenters (Table 6-2) begins on page 6-3. As noted on the public displays, sign-in sheets, and comment sheets at the public hearings, providing names during the public review process meant that each commenter understood that his/her name and comment would be made a part of the public record for this EIS. Table 6-2 provides an alphabetical listing of commenters organized first by the name of the organization (or "Private Citizen"), then by last name, followed by the unique number assigned to each comment submittal.

6.3.2 Locating Responses to Comments

The USAF responses to substantive comments are contained in Table 6-3. Responses were assigned a unique response number based on the original comment number as described above. If, for example, your comment submittal was A_001_DW_A, then the USAF response will be numbered A_001_DW_A-R1. If the comment submittal covered more than one resource area, the comment and response specific to each resource area were separated in the table and the responses were assigned an additional number at the end (e.g., A_001_DW_A-R2, A_001_DW_A-R3, etc.).

Public and agency involvement is an important part of the NEPA process, and all comments are taken into consideration by the USAF during its decision-making process. Many of the comments express the views and opinions of the commenters. Such comments do not require a specific USAF response, but are included as part of the public input.

The USAF appreciates submission of all comments. The fact that a change in the proposed actions or the EIS analysis did not occur as a result of a comment does not reduce the value of the comment or an individual's participation in the Environmental Impact Analysis Process (EIAP).

Table 6-2. Directory of Commenters

Organization (Private Citizen, etc.)	Commenter Name	Comment Number
3rd County Commission District in Sedgwick County	Peterjohn, Karl	M_047_D_A
Airway Heights Washington	Rushing, Pat	F_003_D_A
City of Derby	Sexton, Kathy	M_048_D_A
City of Valley Center	McNown, Michael	M_040_D_A
City of Wichita Airport Authority	White, Victor	M_057_D_A
District of Kansas Senate	Faust-Goudeau, Oletha	M_044_D_A
Div. of Environmental, Safety and Cultural Resource Management	Davis, Jeffrey	G_004_D_A
Environmental Resources and Household Hazardous Waste Facility	Erlenwein, Susan	M_052_D_O
Grand Forks American Legion Post #6	Greene, Robert E	G_002_D_O
Federal Aviation Administration	Roberts, Dennis E.	G_005_D_A
Federal Aviation Administration	Roberts, Dennis E.	M_070_D_A
Federal Aviation Administration	Roberts, Dennis E.	A_008_D_A
Federal Aviation Administration	Roberts, Dennis E.	F_017_D_A
Greater Spokane Incorporated (GSI)	Jarrard, Sandra	F_008_D_O
Kansas Council on Economic Education	Graham, Jim	M_001_DW_O
Kansas House of Representatives	Bridges, Carolyn L	M_013_D_A
Kansas House of Representatives	Flickner, Ryan	M_041_D_A
Kansas House of Representatives	Howell, Jim	M_045_D_A
Kansas House of Representatives	Porter, Toni	M_043_D_A
North Dakota State Water Commission	Weispfenning, Linda	G_006_D_A
North Dakota Dept. of Health	Glatt, L. David	G_003_D_A
Office of Federal Activities	Bromm, Susan	A_009_D_A
Oklahoma State Senate	Schulz, Mike	A_005_D_A
Private Citizen	Alexander, Diana	M_027_D_I
Private Citizen	Alexander, Diana	M_058_D_I
Private Citizen	Blumkin, David	G_001_D_I
Private Citizen	Collingwood, K. Renee	A_001_D_I
Private Citizen	Darnell, Mitch	A_002_D_I
Private Citizen	Duhnke, Todd	M_036_D_I
Private Citizen	Duncan, Jimmye	M_063_D_I
Private Citizen	Dye, Dennis	M_001_D_I
Private Citizen	Eckles, Jim and Margie	M_066_D_I
Private Citizen	Ferraro, Claudio	M_026_D_I
Private Citizen	Gunther, Maurice Clark	M_032_D_I
Private Citizen	Hadley, Rich	F_011_D_I
Private Citizen	Hall, Connie	A_003_D_I
Private Citizen	Hitchcock, David	M_060_D_I
Private Citizen	Howell, Jim	M_020_D_A
Private Citizen	Jones, Dave	F_007_D_I
Private Citizen	Jones, Margaret	F_006_D_I
Private Citizen	Lesher, Keith	M_007_D_I
Private Citizen	Leverett, Joe	A_004_D_O
Private Citizen	Lyon, Vaughn	M_039_D_I
Private Citizen	Lyon, Vaughn	M_035_DW_I
Private Citizen	McClain, Cathy	M_050_D_I

Table 6-2. Directory of Commenters (Continued)

Organization (Private Citizen, etc.)	Commenter Name	Comment Number
Private Citizen	McCue, Ellen L	M_006_D_I
Private Citizen	McCune, John	M_028_D_I
Private Citizen	McDaniel, Brian	M_062_D_I
Private Citizen	McDaniel, Brian M	M_033_D_I
Private Citizen	McDevitt, Jim	F_010_D_I
Private Citizen	Nestelroad, Bill	M_008_D_I
Private Citizen	Nestelroad, William	M_005_D_I
Private Citizen	Neunherz, Andrew	F_012_D_I
Private Citizen	None provided	M_017_D_I
Private Citizen	Pachankis, Johanne	M_004_D_I
Private Citizen	Pawleski, Charles E.	M_030_D_I
Private Citizen	Peterson, James	M_038_D_I
Private Citizen	Pulley, Jack	M_025_D_I
Private Citizen	Pulley, Jack	M_055_D_O
Private Citizen	Roberts, John	M_002_D_I
Private Citizen	Roberts, John	M_021_D_I
Private Citizen	Roberts, John & Audrey	M_022_D_I
Private Citizen	Rupp, Teresa	M_003_D_I
Private Citizen	Russell, L.	M_064_D_I
Private Citizen	Sargent, Bruce	M_034_D_I
Private Citizen	Sargent, Charlotte	M_031_D_I
Private Citizen	Sawdy, Richard F.	F_002_D_I
Private Citizen	Scruggs, Bonnie	M_018_D_I
Private Citizen	Shifflett, Dana	M_009_D_I
Private Citizen	Skeleton, Leon	M_059_D_I
Private Citizen	Spino, Pat	F_009_D_I
Private Citizen	Stephen, Ron	M_029_D_I
Private Citizen	Thompson, Willard	M_071_D_I
Private Citizen	Thwong, Kevin	F_013_D_I
Private Citizen	Wolf, Ronald L.	M_023_D_I
Private Citizen	Wynne, William	M_010_D_I
Sedgwick County	Schlegel, John	M_053_D_A
Sedgwick County Commissioners	Skelton, Jim	M_012_D_A
Sedgwick County Government	Skelton, Jim	M_046_D_A
Spokane City Council	McDaniel, Adam	F_004_D_A
Spokane City Council	Stuckart, Ben	F_001_D_A
Spokane Tribe	Peone, Rudy	F_015_D_T
Spokane Tribe	Wheat, Scott	F_005_D_T
State of Kansas	Brownback, Sam	M_073_D_A
Tanker Force and the Joint Military Committee	Roberts, Wayne	M_056_D_O
U.S. Department of the Interior	Maytubby, Bruce	A_006_D_A
U.S. Department of the Interior	Maytubby, Bruce	M_065_D_A
U.S. Department of the Interior	Spencer, Stephen	A_007_D_A
U.S. Environmental Protection Agency	Bromm, Susan	F_018_D_A
U.S. Environmental Protection Agency	Bromm, Susan	G_007_D_A
U.S. Environmental Protection Agency	Bromm, Susan	M_072_D_A

Table 6-2. Directory of Commenters (Continued)

Organization (Private Citizen, etc.)	Commenter Name	Comment Number
U.S. House of Representatives	Huelskamp, Tim	M_016_D_A
U.S. House of Representatives	Huelskamp, Tim	M_069_D_A
U.S. House of Representatives	Jenkins, Lynn	M_015_D_A
U.S. House of Representatives	Jenkins, Lynn	M_068_D_A
U.S. House of Representatives	McMorris Rodgers, Cathy	F_016_D_A
U.S. House of Representatives	Yoder, Kevin	M_014_D_A
U.S. House of Representatives	Yoder, Kevin	M_037_D_A
U.S. Senate	Roberts, Pat	M_067_D_A
U.S. Senator Jerry Moran	Zamrzla, Mike	M_042_D_A
Via Christi St. Joseph Hospital	Ferraro, Claudio	M_054_D_O
Washington State Dept. of Archaeology and Historic Preservation	Holter, Russell	F_014_D_A
Wichita Air Traffic Control Tower	Carpenter, Kurt	M_051_D_A
Wichita Airport Authority	White, Victor	M_019_D_A
Wichita Independent Business Association	Witsman, Tim	M_061_D_O
Wichita Independent Business Association	Witsman, Tim	M_024_D_O
Wichita Metro Chamber of Commerce	Gann, Debbie	M_049_D_O
Wichita Metro Chamber of Commerce	Plummer, Gary	M_011_D_O

Table 6-3. USAF Responses to Substantive Comments

Comment No.	Comment	Comment Response
A_002_D_I-R3	I also think the time and cost of these studies are a waste of American tax dollars. When a new modern aircraft is introduced and it has less impact of the previous aircrafts which has already had an EIS, it's not necessary for another study. Number one if one makes the DOD mad, Altus could lose the Air Force Base.	Thank you for your comment. As outlined in the Draft EIS, the KC-46A does have different environmental impacts than aircraft previously studied and the areas around the bases proposed for the beddowns have changed, thus altering impacts. The USAF closely scrutinizes proposals to ensure that it conducts only the environmental studies required under the National Environmental Policy Act. Given the potential for significant socioeconomic impacts, the Air Force conducted the EIS for this proposal.
F_003_D_A-R2	The other thing I would like to say is that there are tornadoes in Wichita, Kansas, and in Oklahoma, and we don't have that here. We have pretty nice weather. So you might build some nice buildings down there and save a lot of money, but if you come to Spokane, you will actually save a lot of that money. We have buildings that are just now falling apart that were built back during World War II.	As a part of the Strategic Basing Process the Secretary of the Air Force considered both the quantifiable data included in the basing criteria (See Section 2.2.1 of the Draft EIS) as well as intangible factors, including weather impacts, in the application of military judgment. Thank you for your comment and participation in the environmental impact analysis process.
F_005_D_T-R2	We, too, participated in the development of the JLUS policies, and as with other local jurisdictions, the tribe has adopted and implemented the JLUS that will apply to all development within that 145 acre piece. That is one of the things that we noted in our review of the EIS that we certainly wanted to include, and we will supplement or include in our written testimony, which we will submit by the deadline, the tribe's copy of its JLUS ordinance. And we would appreciate if the EIS could be supplemented to reflect the tribe, as a local government, has also enacted land use regulations consistent with JLUS policies and recommendations.	The USAF recognizes the tribe as a sovereign government with land use regulation consistent with the JLUS. Section 3.2.7 and Table 5-3 of the EIS have been supplemented to reflect these land use regulations.
F_005_D_T-R3	Finally, I'm sure my three minutes is coming up quick, also in our review of the EIS, and we wanted to comment tonight, it's very appropriate that, as I identified the tribe as the resident tribe to be contacted to ensure that any cultural resources are appropriately cataloged and protected pursuant to relevant federal law, NEPA, etc.	Thank you for your comment. The USAF and Fairchild AFB will continue to coordinate with the Spokane Tribe and other affiliated tribes throughout the EIS process for this project and in other projects to ensure the protection of cultural resources.
F_007_D_I-R1	Dave Jones, J-o-n-e-s. I am a retired colonel base commander at Fairchild. I would like to mention just a couple of quick things. I won't take long. One, and which was not discussed here, there's no runway requirements. We have a brand new runway. We have excellent taxiways. They've been fixed, too. All of which were not so good 40 years ago, but they're all very good now. Yes, we have an old hangar. It was built way back when this was the primary experimental base for SAC when they conducted their annual bomb comp, and constantly, we had to refuel up to 100 aircraft simultaneously. As a result, we have the largest gasoline supply system in the Air Force here at Fairchild. So I think a lot of things weren't considered. The other thing is I know all the other bases. And the Tornado Alley has hit Altus and it's McConnell in the past. It just hit Illinois, which it almost never hits. The thing is, and at one time when I was around, it hit Sheppard, which they said, Oh, it will never hit Sheppard. We didn't even have an alarm for it, and it came through and cleaned out the whole warehouse. The thing is, tornadoes are disastrous to aircraft as we've seen just recently. I think that alone makes it questionable, that decision. The one up north is not a very good place to put this kind of business. I can understand why they chose McConnell to a certain extent because it's in the center of the country, but our primary mission today, right this moment, in the long range is going to be in the Pacific. That's why its base was here, was to supply the Pacific. We have traffic continuous out of here. However, with the tanker today, you can go all around the world, so you can put the tanker anywhere. You can put it in New York City if you wanted to, but I don't advise it. Thank you	Thank you for your comment. As described in Section 2.2.1 of the Draft EIS, the USAF strategic basing process used several operational and other criteria to identify candidate and alternative bases for the MOB 1 and FTU missions. These basing criteria included runway length and runway bearing capacity among other criteria. Fairchild AFB met the criteria and for the purposes of the EIS was selected as an alternative base for the MOB 1 mission. The EIS process is focused on evaluating each alternative to inform the Secretary of the Air Force on potential environmental impacts associated with each base. The USAF considers public comments in making decisions. We appreciate your participation in the environmental impact analysis process.

Table 6-3. USAF Responses to Substantive Comments (Continued)

Comment No.	Comment	Comment Response
F_015_D_T-R3	FAFB: Land Use Compatibility: The Tribe also enjoys modern connections to the vicinity of FAFB. In 2001, the United States took legal ownership of the "West Plains Property" in trust for the Tribe. The West Plains Property is located approximately two miles from FAFB, northwest of the intersection of Craig Road and U.S. Highway 2. The Tribe exercises governmental jurisdiction over this 145-acre "trust" parcel consistent with federal law. Since 2007, the Tribe has operated its "SPOKO" retail fuel and convenience store on this 145-acre parcel. To further its goal of achieving self-sufficiency, the Tribe is planning a mixed-use development (referred to herein as the "Project" or the "Spokane Tribe Economic Project" or "STEP") on the West Plains Property. On February 24, 2006 the Tribe submitted a request to the BIA Northwest Regional Office requesting the Secretary to engage in a Two-Part Determination pursuant to Section 20 of the Indian Gaming Regulatory Act ("IGRA") (25 U.S.C. 2719) that would allow the Tribe to conduct Class II and Class III Gaming on the Project Site. See STOI Resolution No. 2006-171 dated February 2, 2006. Because the project site is near FAFB, the Tribe reached out early to Base Command to ensure that STEP will not adversely affect FAAFB Operations. Those efforts included the Tribe's participation in a Joint Land Use Study ("JLUS") commissioned by the Spokane County Board of County commissioners and funded by the Department of Defense. The Department of Defense defines a JLUS as an "Analytical planning study of civilian development patterns and land use activities in the vicinity of a military installation that result in recommendations for instituting compatible civilian land use activities and development patterns that protect and preserve the utility and the operational effectiveness of military installations." Spokane County prepared the JLUS in collaborating with FAFB, Spokane International Airport, local jurisdictions, and representatives from the Spokane Tribe and Kalispell Tribe. The Tribe enacted the West Plains Development Code (attached), in order to implement JLUS recommendations on the West Plains Property. Consistent with the JLUS recommendations, the West Plains Development code imposes restrictions and requirements for STEP, including building heights, density, sound attenuation, wildlife attractants, light and glare. The West Plains Development Code also incorporates mitigation requirements set forth in the Environmental Impact Statement prepared for STEP by the Bureau of Indian Affairs pursuant to Department of Interior regulations set forth at 25 CFR Part 292 ("STEP EIS"). As stated in the Final STEP EIS, at the invitation of the Bureau of Indian Affairs ("BIA"), the USAF participated in the NEPA process as a cooperating agency. The BIA thoroughly considered USAF official comments, provided on the Draft STEP EIS and the Preliminary Final STEP EIS, and in many instances changes were made to the Final STEP EIS as a result of USAF comments. BIA representatives coordinated directly with USAF representatives to ensure that any concerns raised in the comments were satisfactorily addressed. Importantly, the Tribe's West Plains Development code also incorporates mitigation measures recommended within the Final STEP EIS to ensure that the construction and operation of STEP is consistent with FAFB operations. The DEIS mentions that the City of Airway Heights, the City of Spokane, the City of Medical Lake, and Spokane have implemented JLUS recommendations through the enactment of land use regulations. The Tribe respectfully requests that the Final EIS for KC-46A Formal Training Unit and First Main Operating Base Beddown similarly mention the Tribe's implementation of JLUS recommendations through the enactment of the Tribe West Plains Development Code.	The USAF appreciates the current and past coordination efforts with the Spokane Tribe and the involvement of the Spokane Tribe in the environmental impact analysis process for this project. The USAF recognizes the Tribes participation in the JLUS process and Section 3.2.7 and Table 5-3 of the EIS have been updated to reflect the Spokane Tribes implementation of the JLUS regulations.
G_002_D_O-R2	Please note the noise contour you are using for Grand Forks AFB, ND is out of date since the Alert Aircraft Parking Area (AAPA) is no longer attached to the runway. In addition, this area is scheduled to be converted into an industrial park to support the Remotely Piloted Aircraft (RPA) mission.	Thank you for your comment. The noise contours and other noise results for Grand Forks AFB have been updated and are included in the Grand Forks AFB Noise sections of Chapters 3 and 4 of the Final EIS.

Table 6-3. USAF Responses to Substantive Comments (Continued)

Comment No.	Comment	Comment Response
G_003_D_A-R1	This department believes that environmental impacts from the proposed construction will be minor and can be controlled by proper construction methods.	Thank you for your comment. The USAF appreciates your input into the environmental impact analysis process. The conclusions of the EIS are consistent with this comment.
G_003_D_A-R2	All necessary measures must be taken to minimize fugitive dust emissions created during construction activities. Any complaints that may arise are to be dealt with in an efficient and effective manner. We believe the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.	Thank you for your comment. Fugitive dust emissions are addressed in the air quality section for each base in Chapter 4 of the Draft EIS.
G_003_D_A-R3	Care is to be taken during construction activity near any water of the state to minimize adverse effects on a water body. This includes minimal disturbance of stream beds and banks to prevent excess siltation, and the replacement and revegetation of any disturbed area as soon as possible after work has been completed. Caution must also be taken to prevent spills of oil and grease that may reach the receiving water from equipment maintenance, and/or the handling of fuels on the site. Guidelines for minimizing degradation to waterways during construction are attached. 3. Projects disturbing one or more acres are required to have a permit to discharge storm water runoff until the site is stabilized by the reestablishment of vegetation or other permanent cover. Further information on the storm water permit may be obtained from the Department's website or by calling the Division of Water Quality (701-328-5210). The facility is currently covered by the NDPDES industrial storm water permit. The department recommends reviewing whether storm water quality improvements can be incorporated as part of any development or redevelopment project. Check with local officials to be sure any local storm water management considerations are addressed. The U.S. Army Corps of Engineers may require a water quality certification from this department for the project if the project is subject to their Section 404 permitting process. Any additional information which may be required by the U.S. Army Corps of Engineers under the process will be considered by this department in our determination regarding the issuance of such a certification. If you have any questions regarding our comments please feel free to contact this office. Construction and Environmental Disturbance Requirements: These represent the minimum requirements of the North Dakota Department of Health. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect the waters of the State of North Dakota. All projects will be designed and implemented to restrict the losses or disturbances of soil, vegetative cover, and pollutants (chemical or biological) from a site. Soils Prevent the erosion of exposed soil surfaces and trapping sediments being transported. Examples include, but are not restricted to, sediment dams or berms, diversion dikes, hay bales as erosion checks, riprap, mesh or burlap blankets to hold soil during construction, and immediately establishing vegetative cover on disturbed areas after construction is completed. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage. Surface Waters All construction which directly or indirectly impacts aquatic systems will be managed to minimize impacts. All attempts will be make to prevent the contamination of water at construction sites from fuel spillage, lubricants, and chemicals, by following safe storage and handling procedures. Stream bank and stream bed disturbances will be controlled to minimize and/or prevent silt movement, nutrient upsurges, plant dislocation, and any physical, chemical, or biological disruption. The use of pesticides or herbicides in or near these systems is forbidden without approval from this Department. Fill Material Any fill material placed below the high water mark must be free of top soils, decomposable materials, and persistent synthetic organic compounds (in toxic concentrations). This includes, but is not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill materials. All temporary fills must be removed. Debris and solid wastes will be removed from the site and the impacted areas restored as nearly as possible to the original condition.	Thank you for your comment. The USAF is committed to compliance with permits, stormwater requirements and certifications. Should Grand Forks AFB be selected to host the KC-46A MOB 1, the USAF will comply with relevant state and Federal stormwater regulations prior to development.

Table 6-3. USAF Responses to Substantive Comments (Continued)

Comment No.	Comment	Comment Response
G_003_D_A-R4	All necessary measures must be taken to minimize the disturbance of any asbestos-containing material and to prevent any asbestos fiber release episodes. Any facility that is to be renovated or demolished must be inspected for asbestos. Notification of the Department's Division of Air Quality (701-328-5188) is required before any demolition. Removal of any friable asbestos containing material must be accomplished in accordance with section 33-15-13-02 of the North Dakota air pollution control rules. Many buildings constructed prior to 1978 have interior and exterior surfaces coated with lead-based paint. The Office of Housing and Urban Development (HUD), as well as other Federal Housing Authorities, have implemented requirements for reducing exposure to lead from lead-based paint. If the building receives Federal funding, these materials must be handled according to their requirements which may include the use of properly trained individuals for removal and disposal. If the building does not receive Federal funding, the lead-based paint should be properly handled to reduce to prevent exposing workers and building occupants to lead. The department owns no land in or adjacent to the proposed improvements, nor does it have any projects scheduled in the area.	Thank you for your comment. Asbestos, lead-based paint and other toxic substances associated with building demolition are described in the hazardous materials and waste sections for each base in Chapter 4 of the Draft EIS. The USAF is committed to the safe renovation and demolition of facilities. Demolitions and renovations will be conducted in compliance with all relevant state and Federal regulations.
G_003_D_A-R5	Noise from construction activities may have adverse effects on persons who live near the construction area. Noise levels can be minimized by ensuring that construction equipment is equipped with a recommended muffler in good working order. Noise effects can also be minimized by ensuring that construction activities are not conducted during early morning or late evening hours.	The noise sections for each base in Chapter 4 of the Final EIS will be modified to discuss the potential adverse impacts of construction noise.
G_006_D_A-R1	The following comments are submitted regarding the Draft Environmental Impact Statement involving the KC-46 Formal Training Unit (FTU) and First Main Operating Base (MOB 1 Beddown: Page 2-61, Paragraph 5, Line 3: The North Dakota state agency responsible for certification of Section 401 of the Clean Water Act is the North Dakota Department of Health and NOT the North Dakota State Water Commission as stated. If wetlands with a watershed great than 80 acres are drained or filled, a permit is required from the North Dakota State Engineer. Page 4-75, Paragraph 1, Line 5: The North Dakota state agency responsible for certification of Section 401 of the Clean Water Act is the North Dakota Department of Health and NOT the North Dakota State Water Commission as stated. If wetlands with a watershed greater than 80 acres are drained or filled, a permit is required from the North Dakota State Engineer.	Text in Sections 2.8 and 4.3.5.4 of the Final EIS was revised to indicate that the North Dakota Department of Health is responsible for Section 401 certification. Text was also revised to indicate wetland impacts with a watershed greater than 80 acres require a permit from the North Dakota State Engineer.
M_027_D_I-R1	My concerns are based on the crash of a KC-135 tanker crash that released 30,000 gallons of jet fuel. Flight plan concerns me because the crash occurred at 21st and Platt. Maintenance logs indicated problems with autopilot. They also indicated that the landing gear was installed backwards. This information was in Mayday in Wichita by DW Carter. I want to say that McConnell had kept high standards in maintenance. I hope Boeing will cooperate with fix any defects in the tankers. I hope that there is an emergency plan in place if a tragedy such as the one in 1965 again occurs.	Thank you for your comment. Flight safety and mishap prevention are of utmost importance to the USAF in all flight planning and operations. The USAF goes to the greatest lengths possible to minimize the risk to the public, USAF personnel, and operations. The USAF implements stringent flight safety procedures and practices to protect all concerned during flight operations. Flight and ground safety are addressed in the Draft EIS Safety sections. Section 4.4.3 of the Draft EIS indicates that emergency response plans currently in place for the KC-135 aircraft would be updated to include procedures and response actions specific to the new KC-46A aircraft.

Table 6-3. USAF Responses to Substantive Comments (Continued)

Comment No.	Comment	Comment Response
M_027_D_I-R2	My concerns are based on the crash of a KC-135 tanker crash that released 30,000 gallons of jet fuel. I hope that there is an emergency plan in place if a tragedy such as the one in 1965 again occurs.	As described in Section 4.4.3 of the Draft EIS, the USAF maintains emergency response plans for aircraft mishaps. This includes mishaps that could result in fuel spills. As part of the aircraft transition, the USAF will update base emergency response plans to include the KC-46A aircraft.
M_038_D_I-R1	A few weeks ago it was published that all of the Boeing Property next to McConnell is for sale. Why wouldn't it make sense for the government A/F to purchase or lease all of the real-estate, B-52 hanger, B-47 hanger, re-process building, electronics building and A.F. one hanger plus much more and cut down one building all new hangers for the C-46A Tankers. Those hangers will hold several tankers each, I know, I seen it and spoke to a gentleman by phone yesterday at McConnell. Thousands of large air planes have taxied from the Boeing flight line, where there are, blast fences, to McConnell for take-off and landings and taxi back. I hate to see any of our military cut back but perhaps what I've suggested could save some money and be an asset to the A/F.	Thank you for your suggestions. The Boeing property was not evaluated as a potential location for the KC-46A beddown. The Strategic Basing Process as described in Section 2.2.1 of the Draft EIS looked at existing Air Force bases that could support the mission. The acquisition of additional property was not considered a viable option due to the time and expense required to purchase or lease new lands.
M_058_D_I-R2	Also part of the reason why I am here is because of the tragedy that happened in 1965 on 21st and Piatt. My parents lived at 21st and Grove and in listening to the other speakers and watching their presentation, I do think that McConnell would be the best place for it because they seem to be -- their safety record is quite good with the KC-135s. There hasn't been a repeat of what happened that day. And also I was looking at the specs on the KC-46 and if it can survive a nuclear attack, I'm thinking that it's probably a bit more at the very least crashworthy than the KC-135. And I also feel that another thing that should be considered is the -- I would hope that even though Boeing has left our fair city that the close relationship between McConnell and Boeing will continue and that they will be able to put in input on the KC-46A. And in closing, another thing that I am concerned about is if there's any emergency plans that might be put into place or any sort of disaster training scenarios that could be put into place to avoid -- if a tragedy like that would happen again, God forbid, we don't want that and I'm thinking -- and, like I said, I was looking at the specs of the KC-46 and I don't think that's likely, but we do need to make preparations for and plans for disasters whether they occur or not.	Thank you for your comment. Flight safety and mishap prevention are of utmost importance to the USAF in all flight planning and operations. The USAF goes to the greatest lengths possible to minimize the risk to the public, USAF personnel, and operations. The USAF implements stringent flight safety procedures and practices to minimize such incidents. Flight and ground safety are addressed in the Draft EIS Safety sections. Section 4.4.3 of the Draft EIS indicates that the existing emergency response plans currently in place for the KC-135 aircraft would be updated to include procedures and response actions specific to the new KC-46A aircraft.

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TANKER
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AFI 32-7042 – Waste Management

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AFI 32-7064 – Integrated Natural Resources Management

AFI 32-7086 – Hazardous Material Management

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32 CFR 989.22(d) – Department of the Air Force, Mitigation Plan

36 CFR 800.6(c) – Resolution of Adverse Effects

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40 CFR 1508.7 – Terminology and Index, Cumulative Impact

40 CFR 1508.20 – Environmental Impact Statements, NEPA Mitigation

40 CFR 1508.25 – Terminology and Index, Scope

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DoDI 4710.02 – DoD Interactions with Federally-Recognized Tribes

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United States Code

42 U.S.C. 7401 et seq., Clean Air Act of 1970.

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- Altus AFB Base Library, 109 E Avenue, Bldg. 65, Altus AFB, OK 73523
- Altus Public Library, 421 N. Hudson Street, Altus, OK 73521
- Lawton Public Library, 110 SW 4th Street, Lawton, OK 73501

ALTUS AFB AUXILIARY AIRFIELD REPOSITORIES

Rick Husband Amarillo International Airport (AMA)

- Amarillo Public Library, 413 Southeast 4th Avenue, Amarillo, TX 79101

Clinton Sherman Industrial Airpark (CSM)

- Western Plains Library System, 501 S. 28th Street, Clinton, OK 73601

Lubbock Preston Smith International Airport (LBB)

- Mahon Public Library, 1306 9th Street, Lubbock, TX 79401

Fort Worth Alliance Airport (AFW)

- Summerglen Library, 4205 Basswood Boulevard, Fort Worth, TX 76137

FAIRCHILD AFB REPOSITORIES

- Fairchild AFB Library, 2 W. Castle Street, Fairchild AFB, WA 99011
- Spokane Public Library, 906 West Main Avenue, Spokane, WA 99201

GRAND FORKS AFB REPOSITORIES

- Grand Forks AFB Library, 511 Holzapple Street, Grand Forks AFB, ND 58205
- Grand Forks Public Library, 2110 Library Circle, Grand Forks, ND 58201

McCONNELL AFB REPOSITORIES

- McConnell AFB Library, 53476 Wichita Street, Bldg. 412, McConnell AFB, KS 67221
- Central Library, 223 S. Main, Wichita, KS 67202

McCONNELL AFB AUXILIARY AIRFIELD REPOSITORIES

Clinton Sherman Industrial Airpark (CSM)

- Western Plains Library System, 501 S. 28th Street, Clinton, OK 73601

Forbes Field (FOE)

- Topeka & Shawnee County Public Library, 1515 Southwest 10th Avenue, Topeka, KS 66605

Wichita Mid-Continent Airport (ICT)

- Central Library, 223 S. Main, Wichita, KS 67202

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NEPA DISCLOSURE STATEMENT

NEPA DISCLOSURE STATEMENT FOR THE KC-46A FORMAL TRAINING UNT (FTU) AND FIRST MAIN OPERATING BASE (MOB 1) BEDDOWN ENVIRONMENTAL IMPACT STATEMENT (EIS)

The Council on Environmental Quality (CEQ) Regulations at Title 40 of the Code of Federal Regulations (CFR) Section 1506.5(c), which have been adopted by the U.S. Air Force (32 CFR 989), require contractors and subcontractors who will prepare an environmental impact statement to execute a disclosure specifying that they have no financial or other interest in the outcome of the project.

"Financial or other interest in the outcome of the project" is defined as any direct financial benefit such as a promise of future construction or design work in the project, as well as indirect financial benefits the contractor is aware of.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows, to the best of their actual knowledge as of the date set forth below:

(a) _X_ Offeror and any proposed subcontractors have no financial or other interest in the outcome of the project.

(b) ___ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract, or agree to the attached plan to mitigate, neutralize or avoid any such conflict of interest.

Financial or Other Interests:

None – to the best of our knowledge and belief

Certified by:

Patricia Garcia
Signature

PATRICIA L. GARCLA
Name

SR. CONTRACTS REPRESENTATIVE
Title

Leidos, Inc.
Company

February 13, 2014
Date

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GLOSSARY


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GLOSSARY

Above Ground Level (AGL): Altitude expressed in feet measured above the ground surface.

Accident Potential Zone (APZ)**:** An area near a runway that is based on historical military accident and operations data and the application of a margin of a safety that represents those areas where an accident is most likely to occur. APZs are normally 3,000 feet wide and extend up to 15,000 feet from the end of the runway.

Asbestos-containing Material (ACM): any material containing more than 1 percent asbestos.

Air Force Instruction (AFI): Instructions implementing U.S. laws and regulations, and providing policy for USAF personnel and activities.

Air Combat Command (ACC): The U.S. Air Force Command that operates combat aircraft assigned to bases within the contiguous 48 states, except those assigned to Air National Guard and the Air Force Reserve Command.

Air Installation Compatible Use Zone (AICUZ)**:** A land-use-planning program, used by the military, to protect the health, safety, and welfare of those living near military airfields while preserving the defense flying mission. AICUZ presents noise zones and accident potential zones for military airfields and recommendations for compatible land use.

Air Mobility Command (AMC): AMC, a major command with headquarters at Scott Air Force Base, Illinois. AMC provides America's Global Reach. This rapid, flexible, and responsive air mobility promotes stability by keeping America's capability and character highly visible.

Air Quality: The degree to which the ambient air is pollution-free, assessed by measuring a number of indicators of pollution.

Beddown: The provision of facilities and other necessary infrastructure to support a new mission or weapon system.

Bird/Wildlife-Aircraft Strike Hazard (BASH): A U.S. Air Force program to reduce the possibilities of bird or wildlife collisions with aircraft.

Clean Air Act (CAA): This Act empowered the U.S. Environmental Protection Agency to establish standards for common pollutants that represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect public health and safety.

Clean Water Act (CWA): The primary federal law in the United States governing water pollution. The CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution, and ensuring that surface waters would meet standards necessary for human sports and recreation.

Clear Zone (CZ): An accident potential zone constituting the innermost portions of the runway approach.

Council on Environmental Quality (CEQ): The Council is within the Executive Office of the President and is composed of three members appointed by the President, subject to approval by the Senate. Members are to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs of the nation; and to formulate and recommend national policies to promote the improvement of environmental quality.

Day-Night Average Sound Level (DNL): DNL is a noise metric combining the levels and durations of noise events and the number of events over an extended time period. It is a

cumulative average computed over a 24-hour period to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10 dB penalty for sounds after 10:00 P.M. and before 7:00 A.M. DNL is the Federal Aviation Administration's (FAA) primary noise metric. FAA Order 1050.1E defines DNL as the yearly day/night average sound level.

Decibel (dB): A sound measurement unit.

De Minimis Threshold: The minimum threshold for which a conformity determination must be performed for various criteria pollutants in various areas.

Endangered Species: The Endangered Species Act of 1973 defined the term "endangered species" to mean any species (including any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature) that is in danger of extinction throughout all or a significant portion of its range.

Environmental Justice: Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, review must be made as to whether a federal program, policy, or action presents a disproportionately high and adverse human health or environmental effect on minority and/or low-income populations.

Environmental Night: The period between 10 P.M. and 7 A.M. when 10 decibels is added to aircraft noise levels due to increased sensitivity to noise at night.

Fiscal Year: U.S. Government accounting year beginning 1 October through 30 September.

Groundwater: Water held underground in the soil or in pores and crevices in rock.

Floodplain: An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

Formal Training Unit (FTU): A military schoolhouse where U.S. Air Force pilots receive initial aircrew training on a particular aircraft.

Hazardous Material: Solids, liquids, or gases that can harm people, other living organisms, property, or the environment.

Hazardous Waste: Waste that poses substantial or potential threats to public health or the environment. In the United States, the treatment, storage and disposal of hazardous waste is regulated under the Resource Conservation and Recovery Act.

Integrated Noise Model (INM): The INM is the preferred model typically used for Federal Aviation Regulations Part 150 noise compatibility planning and for Federal Aviation Administration Order 1050 environmental assessments and environmental impact statements. INM is a computer model that evaluates aircraft noise impacts in the vicinity of airports. It is developed based on the algorithm and framework from SAE AIR 1845 standard, which used Noise-Power-Distance data to estimate noise accounting for specific operation mode, thrust setting, and source-receiver geometry, acoustic directivity and other environmental factors. The INM can output noise contours for an area or noise level at pre-selected locations. The noise output can be exposure-based, maximum-level-based, or time-based.

Interagency/Intergovernmental Coordination for Environmental Planning (IICEP): A federally mandated process for informing and coordinating with other governmental agencies regarding proposed actions.

Joint Land Use Study (JLUS): A JLUS is a cooperative land use planning effort between military installations and surrounding communities that examines the positive and negative impacts that military installations have on surrounding communities, and vice versa.

Main Operating Base (MOB): A permanently manned, well-protected base with robust infrastructure. MOBs are characterized by command and control structures, enduring family support facilities, and strengthened force protection measures.

Maximum Sound Level (L_{max}): L_{max} is the highest sound level that occurs during a single aircraft overflight. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance. Federal Aviation Administration Order 1050.1E defines L_{max} as a single event metric that is the highest A-weighted sound level measured during an event.

Mean Sea Level (MSL): Altitude expressed in feet measured above average sea level.

Military Operations Area (MOA): Airspace below 18,000 feet above mean sea level established to separate military activities from Instrument Flight Rule traffic and to identify where these activities are conducted for the benefit of pilots using Visual Flight Rule.

Mobile Sources: Includes cars and light trucks, heavy trucks and buses, nonroad engines, equipment, and vehicles.

National Ambient Air Quality Standards (NAAQS): NAAQS are established by the U.S. Environmental Protection Agency for criteria pollutants that represent the maximum levels of background pollution considered safe, with an adequate margin of safety, to protect public health and safety.

National Environmental Policy Act** (**NEPA): The National Environmental Policy Act of 1969 directs federal agencies to take environmental factors into consideration in their decisions.

National Historic Preservation Act** (**NHPA): The National Historic Preservation Act of 1966, as amended, established a program for the preservation of historic properties throughout the United States.

National Register of Historic Places (NRHP): The NRHP is the Federal government's official list of districts, sites, buildings, structures, and objects deemed worthy of preservation.

NOISEMAP: *NOISEMAP* is a group of computer programs developed over a number of years by the U.S. Air Force for prediction of noise exposures in the vicinity of a military installation. NOISEMAP is the primary computer model used by the U.S. Department of Defense for evaluating military fixed-wing aircraft noise. It contains a suite of computer programs for prediction of noise exposure from aircraft flight, maintenance, and ground runup operations. NOISEMAP output includes noise contours, noise levels at preselected locations, and other supplemental metrics to assist users in analyzing impacts resulting from aircraft noise in the airfield environment.

Onset Rate-Adjusted Monthly Day-Night Average Sound Level (DNL_{mr}): Onset Rate-Adjusted Monthly Day-Night Average Sound Level is the measure used for subsonic aircraft noise in military airspace (Military Operations Areas or Warnings Areas). This metric accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder due to the added “surprise” effect. Penalties of up to 11 dB are added to account for this onset-rate. Noise levels are interpreted the same way for L_{dnmr} as they are for DNL. (See DNL above).

Operation: An operation consists of a single activity such as a landing or a takeoff by one aircraft. Each time a single aircraft flies into a different airspace unit, one operation is counted. During a single sortie, an aircraft could fly in several airspace units and conduct a number of operations; therefore, the number of operations exceeds the number of sorties.

Power Setting: The power or thrust output of an engine in terms of kilonewtons thrust for turbojet and turbofan engines or shaft power in terms of kilowatts for turboprop engines.

Primary Aerospace Vehicles Authorized (PAA): PAA consists of the aircraft authorized and assigned to perform a U.S. Air Force wing's mission.

Prime Farmland: Prime farmlands are designations assigned by the U.S. Department of Agriculture. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The land is also used as cropland, pastureland, rangeland, forest land, or other land, but cannot be used as urban built-up land or water.

Region of Influence (ROI): The geographic scope of potential consequences in an area.

Scoping: A National Environmental Policy Act process of identifying the main issues of concern at an early stage in planning in order to discover any alternatives and aid in site selection.

Sortie: A sortie consists of a single military aircraft flight from the initial takeoff through the final landing and includes all activities that occur during that mission. For this EIS, the term sortie is used when referring to the quantity of aircraft operations from the airfield. A sortie can include more than one operation.

Sound Exposure Level (SEL): Sound Exposure Level (SEL) accounts for both the maximum sound level and the length of time a sound lasts. It provides a measure of the total sound exposure for an entire event. Federal Aviation Administration Order 1050.1E defines SEL as a single event metric that takes into account both the noise level and duration of the event and references to a standard duration of one second.

State Historic Preservation Office (SHPO): State department responsible for assigning protected status for cultural and historic resources.

Threatened Species: A species likely to become endangered within the foreseeable future throughout all, or a significant portion, of its range.

Traditional/Cultural Resource: Traditional and cultural resources are any prehistoric or historic district, site or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes.

Wetland, Jurisdictional: A jurisdictional wetland is a wetland that meets all three U.S. Army Corps of Engineers' criterion for jurisdictional status: appropriate hydrologic regime, hydric soils, and facultative to obligate wetland plant communities under normal growing conditions.

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FINAL

KC-46A FORMAL TRAINING UNIT (FTU) AND FIRST MAIN OPERATING BASE (MOB 1) BEDDOWN EIS

Prepared for:
Air Force Civil Engineer Center
Air Mobility Command
Air Education and Training Command
United States Air Force

VOLUME II

March 2014

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
ACM	asbestos-containing material
AFB	Air Force Base
AFI	Air Force Instruction
AFW	Fort Worth Alliance Airport
AGE	aerospace ground equipment
AGL	above ground level
AHAS	Avian Hazard Advisory System
AICUZ	Air Installation Compatible Use Zone
AMC	Air Mobility Command
ANSI	American National Standards Institute
APE	area of potential effect
APZ	accident potential zone
AT/FP	Anti-Terrorism/Force Protection
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CH_4	methane
CHABA	Committee on Hearing, Bioacoustics and Biomechanics
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CSM	Clinton-Sherman Industrial Airpark
CWA	Clean Water Act
CZ	clear zone
dB	decibel(s)
dBA	A-weighted decibel
DNL	day-night average sound level
DoD	U.S. Department of Defense
DODI	Department of Defense Instruction
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FICAN	Federal Interagency Committee on Aircraft Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FTU	Formal Training Unit
GHG	greenhouse gases
GMV	government motor vehicle
GWP	global warming potential
HAP	hazardous air pollutant
Hz	hertz
ICRMP	Integrated Cultural Resources Management Plan
IMPLAN	Impact Analysis for Planning

ACRONYMS AND ABBREVIATIONS (Continued)

LAX	Los Angeles International Airport
LBP	lead-based paint
LEED	Leadership in Energy and Environmental Design
MOB 1	First Main Operating Base
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIPTS	Noise-Induced Permanent Threshold Shift
NLR	noise level reduction
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
O_3	ozone
ODS	ozone depleting substance
PCB	polychlorinated biphenyl
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POV	privately owned vehicle
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTS	Permanent Threshold Shift
ROI	region of influence
SEL	sound exposure level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
TTS	Temporary Threshold Shift
U.S.C.	*United States Code*
UCLA	University of California, Los Angeles
UFC	Unified Facilities Criteria
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

APPENDIX A

CORRESPONDENCE

This Appendix is contained on the CD-ROM on the back cover of this document.

APPENDIX B

DEFINITION OF RESOURCE AND METHODOLOGY FOR ANALYSIS

APPENDIX B DEFINITION OF RESOURCE AND METHODOLOGY FOR ANALYSIS

This appendix directly corresponds to the environmental resource areas described in Volume I, Chapter 3, as the baseline conditions, and the analysis of consequences, as described in Volume I, Chapter 4, for each of the four bases under consideration. The environmental resource areas are ordered according to the order in Volume I, Chapters 3 and 4. For each environmental resource area, this appendix provides a definition of the resource, the regulatory setting, if applicable, and a description of the methodology used to evaluate the environmental resource area.

Because the same resource areas were analyzed for each of the four bases, the definition, regulatory setting, and methodology are the same for all four bases. The analysis methodology addresses both the context of the environmental resource and the intensity of potential consequences to the resource resulting from implementation of the KC-46A missions.

B.1 NOISE

B.1.1 RESOURCE DEFINITION

Sound is tiny vibrations in a medium such as air or water that are detected by the ear. Noise is specifically unwanted sound or, alternatively, a lack of 'peace and quiet.' There is a wide variety of types of noises. Reactions to noises depend not only on the qualities of the noise (e.g., intensity, pitch, duration, or time of day) but also on the characteristics of the listener (e.g., sensitivity of the individual and attitude toward the noise source) and the activity in which the listener is engaged at the time the noise occurs.

B.1.2 REGULATORY SETTING

Since legal limits on allowable noise levels could, in some cases, reduce the combat effectiveness of military equipment, military equipment has been exempted from regulations that impose noise limitations. However, several policies and regulations are in place to limit the effects of military noise.

The U.S. Air Force (USAF) recognizes that noise-sensitive land uses are not compatible with elevated aircraft noise levels and has implemented the Air Installation Compatible Use Zone (AICUZ) program, as described in Air Force Instruction (AFI) 32-7063 and Department of Defense Instruction (DoDI) 4165.57, to minimize incompatible land use. In 1992, the Federal Interagency Committee on Noise (FICON) established a set of guidelines detailing which land uses are compatible at which noise levels; these guidelines have been adopted as part of the AICUZ program.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating day-night average sound level (DNL) to compatible land uses. The FICUN guidelines consider areas with noise levels of 75 decibels (dB) DNL or greater as unacceptable living environments. Areas between 65–74 dB DNL are considered "generally unacceptable" for noise-sensitive land uses such as residences, schools, hospitals, and public services. Houses located in areas between 65–74 dB DNL may not qualify for Federal mortgage insurance without additional costs associated with installing noise attenuation. In the outdoor noise environment, levels greater than 65 dB DNL may be annoying to some people during communications. Generally, residential development is not recommended in areas experiencing noise levels of 65 A-weighted decibels (dBA) or greater. Although discouraged, residential development is compatible within the 65–69 dBA and 70–74 dBA contours, provided noise

reduction levels of 25 dB and 30 dB, respectively, are achieved. Commercial/retail businesses are compatible without restrictions up to 69 dBA, and up to 79 dBA, provided that noise reduction levels of 25 dB and 30 dB, respectively, are achieved for public areas. Industrial/manufacturing, transportation, and utility companies have a high noise level compatibility, and, therefore, can be located within the higher noise zones. Additional discussion of the relationship between land use and noise can be found in Volume I, Chapter 3, Sections 3.1.7, 3.2.7, 3.3.7, and 3.4.7, which are the land use sections for each of the four bases.

On-base noise exposure to workers may exceed 80 dB DNL. Workers in known high noise exposure locations may be required to wear hearing protection devices including, but not limited to, earplugs and earmuffs. The hearing conservation programs at each base are conducted in accordance with Air Force Occupational Safety and Health Standard 48-20, “Occupational Noise and Hearing Conservation Program,” DoDI 6055.12, “DoD Hearing Conservation Program,” and Title 29 of the *Code of Federal Regulations* (CFR) Section 1910.95, “Occupational Noise Exposure.” The Bioenvironmental Engineering Office administers the Hearing Conservation Program at each of the candidate bases. Representatives from the Bioenvironmental Engineering Office visit facilities in which workers could potentially be exposed to noise levels exceeding noise exposure thresholds. A health risk assessment is conducted involving dosimeter testing of a representative sample of employees. An audiometric monitoring program is initiated if noise exposure exceeds established thresholds.

Per U.S. Department of Defense (DoD) policy, the 80 dB DNL noise contour is used to identify populations most at risk of potential hearing loss (USD 2009). If no residence or populated area is within the 80 dB DNL contour, then no further risk assessment is warranted. No residences or populated areas are within the 80 dB DNL noise contours for any of the four candidate locations. Therefore, Potential Hearing Loss risk assessment was not warranted.

B.1.3 METHODOLOGY

B.1.3.1 Base Vicinity

Noise levels in the vicinity of the Formal Training Unit (FTU) and First Main Operating Base (MOB 1) bases were modeled using NOISEMAP Version 7.2. In accordance with current USAF policy, NOISEMAP runs were conducted using the topographic effects module. This module accounts for the effects of local terrain and ground surface type on the propagation of sound.

The areas exposed to elevated noise levels are shown using DNL noise contours at 5 dB increments from 65 dB to 85 dB. Elevated DNL implies that overflight noise is particularly frequent and intense. In general, noise levels are highest on and near the airfield itself and decrease with distance from the airfield. However, in a few instances, the overlapping of two or more flight paths generates a geographically separated area in which noise exceeds 65 DNL. These instances appear as small noise contour polygons separated from the larger noise contour set.

The number of off-base persons exposed to noise level increments was estimated using 2010 U.S. Census data. Noise contours were overlaid on census blocks to determine the fraction of each census block that lies within each noise level increment. Census block population was apportioned to inside or outside of the noise level increment based on the fraction of the census block affected. This method assumes even distribution of population with the census block. The U.S. Census counts permanent residents; non-permanent residents are not counted using this method.

B.1.3.2 Auxiliary Airfields

Aircrews associated with the KC-46A FTU scenario would make use of auxiliary airfields to provide aircrews with varied training experiences. The auxiliary airfields proposed for regular use by the KC-46A FTU are heavily used under baseline conditions. At each auxiliary airfield proposed for use, the current level of operations was compared against proposed additional operations to determine potential DNL increase.

KC-46A operations at auxiliary airfields would be expected to use the same procedures being used by other aircraft at the airfields currently. The KC-46A would be expected to overfly the same ground areas, use the same pattern altitudes, and conform to the same runway usage patterns as current operations. To ensure that the noise level increase threshold of 0.5 dB DNL would not be exceeded as a result of temporary or longer-term increases in KC-46A operations tempo, a mission evolution factor was applied. The mission evolution factor chosen was 150 percent of proposed averaged KC-46A operations. In calculation of the DNL metric, noise events occurring between 10:00 P.M. and 7:00 A.M. are assessed a 10 dB penalty. As a result, an aircraft operation occurring between 10:00 P.M. and 7:00 A.M. has the same effect on cumulative DNL as 10 of the same operations occurring during other time periods. The KC-46A would not be expected to conduct operations at auxiliary airfields between 10:00 P.M. and 7:00 A.M.

Each aircraft type operating at the auxiliary airfields was categorized as being either "as loud or louder than a KC-46A" or "less loud than a KC-46A" based on comparison of noise level at a 1,000-foot distance and a standard aircraft configuration type. In calculation of potential DNL change, all aircraft classified as "loud or louder" than a KC-46A were treated as if they were exactly as loud as a KC-46A and aircraft "less loud than a KC-46A" were disregarded. This approach generates conservative results. The potential DNL increase was calculated using the formula below, and results are shown in Table B-1.

$$\mathbf{DNL_{increase} = 10\ LOG\ (N_{day\ KC46} + [10{*}N_{night\ KC46}]) - 10\ LOG\ (N_{day\ existing} + [10{*}N_{night\ existing}])}$$

Table B-1. Calculation of Potential DNL Increase

Base	Proposed KC-46A[a]		Existing			Conclusion	
	Annual Airfield Operations	Annual Operations After Mission Evolution Factor	Existing Annual Operations	Percent Existing Operations as Loud or Louder than KC-46	Percent 2200-0700 (Aircraft Types as Loud or Louder)	DNL Change Not Expected to Be Exceeded	Requires Further Analysis (Yes/No [Y/N])
Altus AFB FTU Scenario Auxiliary Airfields							
AMA	517	776	54,115	31%	3%	0.15	N
CSM	3,681	5,522	28,485	92%	3%	0.66	Y
AFW	2,170	3,255	100,756	12%	15%	0.45	N
LBB	148	222	67,919	25%	4%	0.04	N
McConnell AFB FTU Scenario Auxiliary Airfields							
CSM	977	1,466	28,485	92%	3%	0.18	N
FOE	977	1,466	24,742	73%	11%	0.18	N
ITC	4,561	6,842	165,035	34%	11%	0.26	N

[a] No KC-46A operations would be conducted at night (10:00 P.M. to 7:00 A.M.).

Key: AMA= Rick Husband Amarillo International Airport; AFW= Fort Worth Alliance Airport; CSM= Clinton-Sherman Industrial Airpark; FOE= Forbes Field; ICT= Wichita Mid-Continental Airport; LBB=Lubbock Preston Smith International Airport

As shown in the Table B-1, the potential DNL increase would exceed 0.5 dB only at Clinton-Sherman Industrial Airpark (CSM) under the Altus Air Force Base (AFB) FTU scenario. Increases of less than 0.5 dB would not be expected to be noticed by people near the airfield, and noise impacts would be minimal. No further noise analysis was conducted at these locations.

B.2 AIR QUALITY

B.2.1 RESOURCE DEFINITION

Air quality in a given location is defined by the size and topography of the air basin, the local and regional meteorological influences, and the types and concentrations of pollutants in the atmosphere. The significance of a pollutant concentration often is determined by comparing its concentration to an appropriate national or state ambient air quality standard. These standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population. The U.S. Environmental Protection Agency (USEPA) established the National Ambient Air Quality Standards (NAAQS) to regulate the following criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. The NAAQS generally may not be exceeded more than once per year, except for annual standards, which may never be exceeded. Units of concentration for these standards generally are expressed in parts per million (ppm) or micrograms per cubic meter (μg/m^3). Table B-2 presents the NAAQS.

Table B-2. National Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards	
		Primary[a, b]	Secondary[a, c]
Ozone	8-hour	0.075 ppm (147 μg/m^3)	Same as primary
Carbon monoxide	8-hour	9 ppm (10 mg/m^3)	–
	1-hour	35 ppm (40 mg/m^3)	–
Nitrogen dioxide	Annual	0.053 ppm (100 μg/m^3)	Same as primary
	1-hour	0.10 ppm (188 μg/m^3)	–
Sulfur dioxide	3-hour	–	0.5 ppm (1,300 μg/m^3)
	1-hour	0.075 ppm (105 μg/m^3)	–
PM_{10}	24-hour	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual	12 μg/m^3	15 μg/m^3
	24-hour	35 μg/m^3	35 μg/m^3
Lead	Rolling 3-month period	0.15 μg/m^3	Same as primary

[a] Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
[b] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
[c] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

The NAAQS 8-hour O_3 standard is attained when the measured average of the annual fourth-highest daily maximum 8-hour average concentration is less than or equal to 0.075 ppm. For CO and PM_{10}, the NAAQS are not to be exceeded more than once per year. The NAAQS annual NO_2 standard is attained when the annual arithmetic mean concentration in a calendar year is less than or equal to 0.053 ppm. The 1-hour NO_2 standard is attained when the 3-year average of the 98th percentile of the daily maximum 1-hour average concentration does not exceed 0.10 ppm. For SO_2, the primary NAAQS is attained if the 1-hour concentration is less than or equal to 0.075 $\mu g/m^3$. The NAAQS $PM_{2.5}$ standards are attained when the annual arithmetic mean concentration is less than or equal to 12 $\mu g/m^3$ and when the 98th percentile of 24-hour concentration is less than or equal to 65 $\mu g/m^3$.

O_3 concentrations are the highest during the warmer months of the year and coincide with the period of maximum insolation. Maximum O3 concentrations tend to be homogeneously spread throughout a region, as it often takes several hours to convert precursor emissions to O_3 (mainly nitrogen oxides [NO_x] and photochemically reactive volatile organic compounds [VOCs]) in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

B.2.1.1 Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. The U.S. Global Change Research Program report, *Global Climate Change Impacts in the United States*, states the following:

- Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
- Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (^oF). By 2100, it is projected to rise another 2 ºF to 11.5 ^oF. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat-trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract some of the human-induced warming, slowing the rise in global temperature, but these effects would only last a few years.
- Reducing emissions of carbon dioxide (CO_2) would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane (CH_4), and some types of particles, such as soot, would begin to reduce warming within weeks to decades.

- Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere have also been observed. Over the past 30 years, temperatures have risen faster in winter than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7 ºF. Some of the changes have been faster than previous assessments had suggested.
- These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment. (USGCRP 2009).

GHGs include water vapor, CO_2, CH_4, nitrous oxide, O_3, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the earth's surface relative to CO_2. The GWP of CO_2 is 1, and is, therefore, the standard by which all other GHGs are measured. GHGs are often reported as carbon dioxide equivalent (CO_{2e}), which is used to express emissions of GHG relative to emissions of CO_2.

The potential effects of GHG emissions from the project scenarios are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project scenarios have been quantified to the extent feasible in this Final Environmental Impact Statement (EIS) for information and comparison purposes.

B.2.1.2 Ozone Depleting Substances

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer prohibited production of all Class I ozone depleting substances (ODSs) in signatory countries by 1996. The Clean Air Act (CAA) amendments of 1990 govern the consumption, transportation, use, and disposal of ODSs. Section 326 of the fiscal year 1993 National Defense Authorization Act requires Senior Acquisition Official approval for contracts requiring use of ODSs. The KC-46A will be the first Air Mobility Command (AMC) aircraft to be completely free of ODSs. The USAF-approved halon alternative is HSC-125. Handheld extinguishers used in the KC-46A also will be ODS-free, whereas commercial aircraft use ODS for all fire suppression systems.

B.2.2 REGULATORY SETTING

The CAA and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The CAA establishes air quality planning processes and requires areas in nonattainment of an NAAQS to develop a State Implementation Plan (SIP) that details how the state will attain the standard within mandated timeframes. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area. The following summarizes the air quality rules and regulations that apply to the project scenarios.

B.2.2.1 Federal Regulations

CAA Section 176(c) and USEPA's General Conformity implementing regulation generally prohibit federal agencies from engaging in, supporting, permitting, or approving any activity that does not conform to the most recent USEPA-approved SIP in nonattainment or maintenance areas. This means that federal projects in such areas or other activities using federal funds or requiring federal approval (1) will not cause or contribute to any new violation of an NAAQS; (2) will not increase the frequency or severity of any existing violation; or (3) will not delay the timely attainment of any standard, interim emission reduction, or other milestone. CAA Section 176(c) (42 U.S. Code [USC] 7506(c)) and 40 CFR Part 93, Subpart B, implement the USEPA General Conformity Rule.

The General Conformity Rule applies to Federal actions affecting areas that are in nonattainment of an NAAQS and to designated maintenance areas (attainment areas that have been reclassified from a previous nonattainment status and are required to prepare an air quality maintenance plan). Conformity requirements only apply to nonattainment and maintenance pollutants and their precursor emissions. Conformity determinations are required when the annual direct and indirect emissions from a proposed Federal action equal or exceed an applicable *de minimis* threshold. These thresholds vary by pollutant and the severity of nonattainment conditions in the region affected by the proposed action. The General Conformity Rule applies to proposed KC-46A operations within the following project regions: (1) for actions proposed at Altus AFB, the serious O_3 nonattainment area that encompasses the Fort Worth Alliance Airport (AFW) auxiliary airfield and (2) for actions proposed at Fairchild AFB, the Spokane CO and PM_{10} maintenance areas, about 4 miles east of the eastern portion of Fairchild AFB. Proposed KC-46A operations within these areas would conform to the applicable SIP if their annual emissions remain below (1) 50 tons per year of VOCs or NO_x for the AFW auxiliary airfield and (2) 100 tons per year of CO and PM_{10} for the Spokane area.

Under the CAA, state and local agencies may establish air quality standards and regulations of their own, provided these are at least as stringent as the Federal requirements. These state and local standards and regulations are described in the affected environment sections for each base in Volume I, Chapter 3 (see Sections 3.1.2, 3.2.2, 3.3.2, and 3.4.2). In addition, Table B-3 presents state ambient air quality standards promulgated by the Washington Department of Ecology and North Dakota Department of Health.

B.2.2.2 Greenhouse Gases

The USEPA has promulgated several final regulations involving GHGs either under the authority of the CAA, or as directed by Congress, but none of them apply directly to the project scenarios. On 18 February 2010, the Council on Environmental Quality (CEQ) released its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (CEQ 2010), which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more per year CO_{2e} should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance, but rather an indicator that a quantitative and qualitative assessment should be included in the NEPA documentation. The purpose of quantitative analysis of CO_{2e} emissions in this Final EIS is for its potential usefulness in making reasoned choices among scenarios.

Table B-3. Washington and North Dakota Ambient Air Quality Standards

Pollutant	Averaging Time	State Standards	
		Washington	North Dakota
Ozone	8-hour		0.075 ppm (147 μg/m^3)
	1-hour	0.12 ppm (235 μg/m^3)	
Carbon monoxide	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1-hour	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)
Nitrogen dioxide	Annual	0.05 ppm (100 μg/m^3)	0.05 ppm (100 μg/m^3)
	1-hour		0.10 ppm (188 μg/m^3)
Sulfur dioxide	Annual	0.02 ppm	
	24-hour	0.10 ppm	
	3-hour		0.5 ppm (1,300 μg/m^3)
	1-hour	0.40 ppm[a]	
	1-hour	0.25 ppm[b]	0.075 ppm (196 μg/m^3)
PM_{10}	Annual	50 μg/m^3	
	24-hour	150 μg/m^3	150 μg/m^3
$PM_{2.5}$	Annual		15 μg/m^3
	24-hour		35 μg/m^3
Total Suspended Particulates	Annual	60 μg/m^3	
	24-hour	150 μg/m^3	
	Annual[c]	0.02 ppm 28 μg/m^3	
	24-hour	0.1 ppm 140 μg/m^3	
	1-hour[d]	0.2 ppm 280 μg/m^3	
	Instantaneous	10 ppm (14 mg/m^3)	

[a] Not to be above this level more than once in a calendar year.
[b] Not to be above this level more than twice in a consecutive 7-day period.
[c] Maximum arithmetic mean concentration averaged over 3 consecutive months.
[d] Not to be exceeded more than once per month.

B.2.3 METHODOLOGY

The air quality analysis estimated the magnitude of emissions that would occur from proposed KC-46A construction and operational activities at each proposed base location. Depending on the project scenario, the estimation of proposed operational impacts is based on (1) the net increase in emissions due to the addition of KC-46A aircraft or (2) the net change in emissions due to the replacement of existing KC-135 operations with operations from the beddown of KC-46A aircraft.

Potential impacts on air quality are evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. The CEQ defines significance in terms of context and intensity in 40 CFR Section 1508.27. This requires that the significance of an action must be analyzed in respect to the setting of the action and based relative to the severity of the impact. The CEQ NEPA regulations (40 CFR 1508.27(b)) provide 10 key factors to consider in determining the intensity of an impact.

In the case of criteria pollutants for which the project region is in attainment of an NAAQS, the analysis compared the net increase in annual air pollutant emissions estimated for each project scenario to the USEPA Prevention of Significant Deterioration (PSD) threshold for new major sources of 250 tons per year of a pollutant as an indicator of significance or non-significance of projected air quality impacts. In the case of criteria pollutants for which the project region does not attain an NAAQS, the analysis compared the net increase in proposed annual emissions to the applicable pollutant threshold that requires a conformity determination for that region.

If proposed emissions exceed a PSD or conformity threshold, further analysis was conducted to determine whether impacts were significant. In such cases, if proposed emissions (1) do not contribute to an exceedance of an ambient air quality standard or (2) conform to the approved SIP, then impacts would be less than significant.

B.2.3.1 Construction

The KC-46A project scenarios at each proposed basing location would require construction and/or renovation of airfield facilities, including training facilities, hangars, taxiways, and maintenance and fueling facilities. Air quality impacts due to proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of equipment on exposed soil. Construction activity data were developed to estimate proposed construction equipment usages and associated combustive and fugitive dust emissions for each project scenario.

Factors needed to derive construction source emission rates were obtained from the *Compilation of Air Pollutant Emission Factors*, AP-42, Volume I (USEPA 1995); the USEPA NONROAD2008a model for nonroad construction equipment (USEPA 2009); and the USEPA MOVES2010b model for on-road vehicles (USEPA 2013).

Inclusion of standard construction practices and Leadership in Energy and Environmental Design (LEED) Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. The standard construction practices for fugitive dust control include the following:

1. Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
2. Minimize the amount of disturbed ground area at a given time.
3. Suspend all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site and stabilize all disturbed areas with water application.
4. Designate personnel to monitor the dust control program and to increase watering, as necessary, to minimize the generation of dust.

B.2.3.2 Operations

Sources associated with operation of the proposed KC-46A scenarios at each basing location would include (1) operations and engine maintenance/testing of aircraft, (2) onsite privately owned vehicles (POVs) and government motor vehicles (GMVs), (3) offsite POV commutes, (4) aerospace ground equipment (AGE), (5) nonroad mobile equipment, (6) mobile fuel transfer operations, and (7) stationary and other sources. Operational data used to calculate projected KC-46A aircraft emissions were obtained from data used in the project noise analyses. Factors used to calculate combustive emissions for the KC-46A aircraft are based on emissions data developed by Pratt and Whitney for the PW4062 engine (ICAO 2013). The operational times in mode for the KC-46A engine are based on those for the KC-135 aircraft (Air Force Civil Engineer Center 2013).

Emissions from non-aircraft sources due to the proposed KC-46A scenarios at each basing location were estimated by the following methods:

1. Emissions from the usage of AGE by KC-46A aircraft at Altus AFB are based on AGE usages for existing C-17 and KC-135 aircraft at Altus AFB. Emissions from the usage of AGE by KC-46A aircraft at all other base locations are based on AGE usages for existing KC-135 aircraft at Fairchild AFB.
2. Emissions from POVs, GMVs, and stationary sources were estimated by multiplying existing emissions generated at each base for these sources by the ratio of total base employment populations associated with each proposed scenario and baseline conditions.
3. The emission estimations for AGE, POVs, GMVs, and nonroad equipment simulated the gradual turnover of these sources in the future to vehicle and equipment fleets with new and cleaner USEPA emission standards.
4. Emissions from mobile fuel transfer operations were estimated by multiplying existing emissions for this source at Altus AFB by the ratio of total base employment populations associated with each proposed scenario and baseline conditions at Altus AFB.

The air quality analysis uses calendar year 2012 to define existing emissions, as it includes the most recent calendar year of operational activities at each basing location.

The analysis of proposed aircraft operations is limited to operations that occur within the lowest 3,000 feet (914 meters) of the atmosphere, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

B.3 SAFETY

B.3.1 RESOURCE DEFINITION

Ground and flight safety involving aviation operations conducted by the USAF are addressed in this section. Because of the proposal to construct within portions of the airfield environment, the focus of this section is on safety-of-flight issues associated with airfield operations. Within the ground safety section, issues involving operations and maintenance (O&M) activities that support operation of the airfield are addressed. Also considered in this section is the safety of personnel and facilities on the ground that may be placed at risk from flight operations. Within the aircraft mishaps/flight safety section for each base, aircraft flight risks and safety issues associated with conducting aviation activities at the respective bases are addressed. Historic information on aircraft accidents for the

KC-135 at each base is also presented to give the reader perspective as to the frequency of major mishaps, which occurred during the lengthy service of the existing tanker aircraft.

KC-46A flight risks and safety issues associated with conducting aviation activities at the base and in the near-base airspace are addressed. Any KC-46A accidents at the airfield would have direct impacts on the ground in the immediate vicinity of the mishap as a result of explosion/fire and debris spread.

B.3.2 REGULATORY SETTING

Numerous Federal, civil, and military laws and regulations govern operations at bases and in the surrounding airspace. Individually and collectively, they prescribe measures, processes, and procedures required to ensure safe operations and to protect the public, military, and property.

B.3.3 METHODOLOGY

A variety of elements associated with implementation of the KC-46A scenarios at any of the four bases that could potentially affect safety are evaluated relative to the degree to which the action increases or decreases safety risks to the public or private property. Flight and ground safety are assessed for the potential to increase risk and the capability to manage that risk by responding to emergencies.

Impacts to safety are assessed according to the potential to increase or decrease in safety risks to personnel, the public and property. The development activities associated with the proposed KC-46A missions are considered to determine whether additional or unique safety risks are associated with its undertaking. If any activity associated with the KC-46A scenarios indicates a major variance from baseline conditions, it would be considered a significant safety impact.

B.3.3.1 Flight Safety

The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur as a result of mid-air collisions, collisions with man-made structures or terrain, weather-related accidents, mechanical failure, pilot error, or bird-aircraft collisions. Collisions with structures around the airfield are controlled through airfield setbacks and safety zones that restrict construction around the airfield so that both the ground surface is clear for ground maneuvering and the airspace is clear of obstructions such as groves of trees, poles and power lines, and tall structures. The AICUZ defines the accident potential zones (APZs) around the airfield and prescribes restrictions on any construction in the clear zone (CZ) (see Figure B-1). Land use restrictions are recommended for APZs I and II, based mostly on the intensity of use. That is, activities where people congregate are not recommended, and uses where people spend a high percentage of time (such as residential) are also not recommended.

The USAF defines five major categories of aircraft mishaps: Classes A, B, C, D, and E, which includes high accident potential. Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, and/or destruction of an aircraft. Class B mishaps result in permanent partial disability or inpatient hospitalization of three or more personnel and/or a total cost of between $500,000 and up to $2 million. Class C mishaps involve an injury resulting in any loss of time from work beyond the day or shift on which it occurred, an occupational illness that causes loss of time from work at any time, or an occupational injury or illness resulting in permanent change of job and/or reportable damage of between $50,000 and up to $500,000. High accident potential events are any hazardous occurrence that has a high potential for becoming a mishap. Class C mishaps and high accident potential, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public.

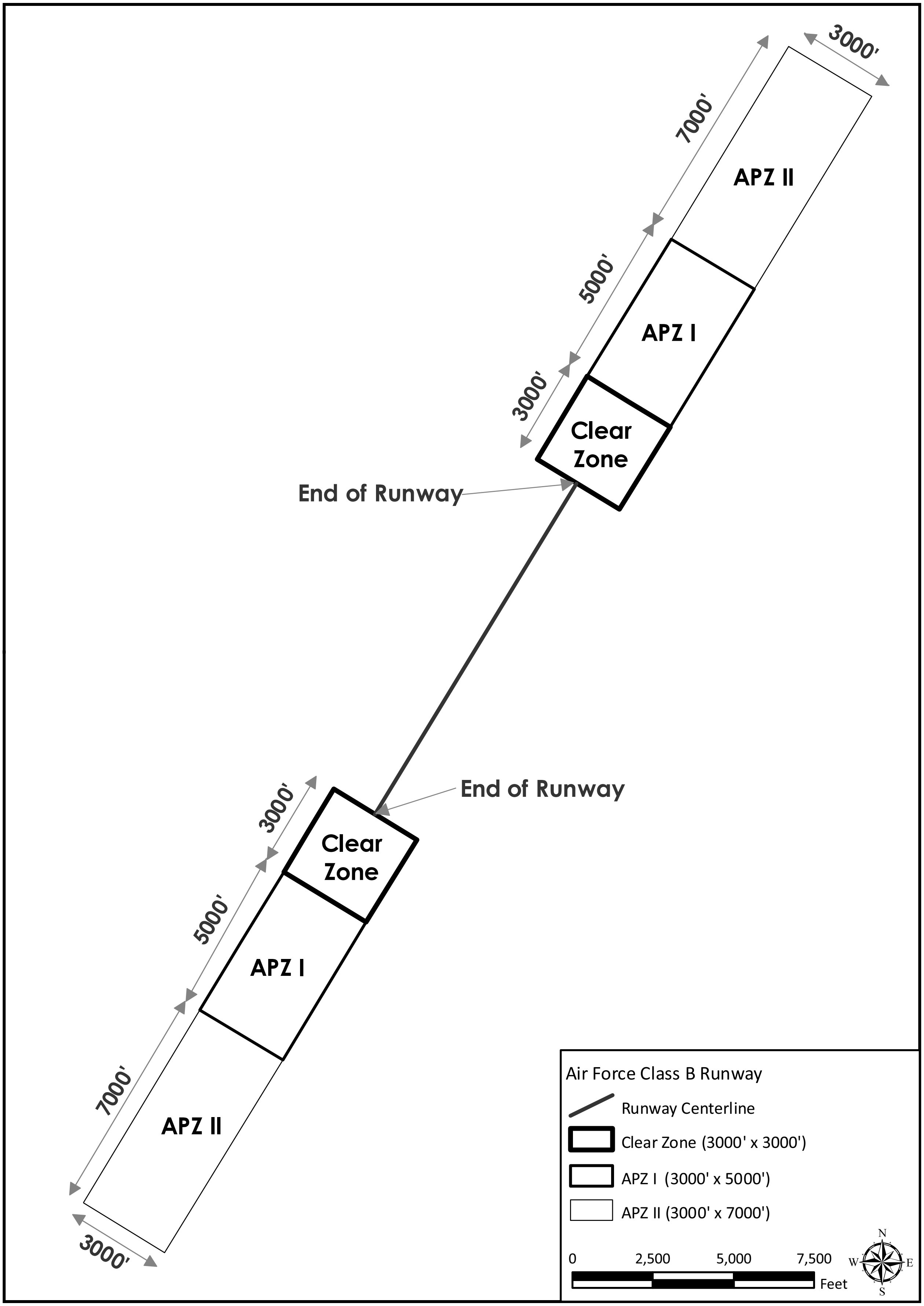

Figure B-1. Air Force Clear Zone and Accident Potential Zones for Class B Runways

Class D mishaps result in total cost of property damage of $20,000 or more, but less than $50,000; or a recordable injury or illness not otherwise classified as a Class A, B, or C mishap. Note that in 2010, the threshold for determining the class of mishaps was raised from $1 to $2 million for Class A mishaps, and the ceiling was raised for Class B from $1 million to $2 million.

Accident rates for commercial aircraft are determined using accidents per million departures (or flight cycles) since there is a stronger statistical correlation between accidents and departures than there is between accidents and flight hours, between accidents and the number of airplanes in service, or between accidents and passenger miles or freight miles.

This Final EIS focuses on USAF Class A mishaps because of their potentially catastrophic results. Based on historical data on mishaps at all bases, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Mishap rates do not consider combat losses due to enemy action. In evaluating this information, it should be emphasized that data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft. Mishap rates are statistically assessed as an occurrence rate per 100,000 flying hours. For the purposes of this analysis, C-135 aircraft include the RC-135, EC-135, and the KC-135 since they share a common airframe based upon the Boeing 707, as modified for military use. Table B-4 reflects the cumulative annual USAF Class A mishap rates of the C-135 for the periods for which accident records have been established. Cargo and Command and Control type aircraft were included since their Mission-Design-Series are similar. The KC-135 entered service with the USAF in 1957; it is one of six military fixed-wing aircraft with over 50 years of continuous service with its original operator. Since the R model conversion of some of the fleet in the 1990s, the safety record of the KC-135 has been on par with that of any modern airliner.

Table B-4. Air Force Class A Accident History for Selected Models of Transport Modified Mission Design/Code Aircraft

Aircraft	Reporting Period	Accident Rate per 100,000 Hours	Lifetime Hours Flown
C-135[a]	CY57-FY12	0.56	14,753,417
C-141	CY64-FY12	0.32	10,641,974
C-17	FY91-FY12	1.10	2,726,728
C-5	CY68-FY12	1.03	2,531,479
C-10	CY81-FY12	1.03	1,558,325

[a] Includes all variants such as EC and KC types, including EC-135, RC-135, and KC-135
Key: CY = calendar year; FY = fiscal year
Source: AFSC 2013

An aircraft crash is what is known in the probability analysis world as a low probability, high consequence risk. Aircraft are designed to ensure that aircraft accidents are rare events. To minimize these accidents, factors causing or contributing to accidents must be understood and prevented. Previous research has studied accident data to determine these factors. The low rate of accidents, however, makes it difficult to discover repeating patterns of these factors.

Levels of safety for commercial airframes are typically measured by the number of accidents and incidents and their rates. An aircraft accident is defined as an occurrence associated with the operation of an aircraft in which people suffer death or injury, and/or in which the aircraft receives substantial damage.

There have been many scholarly papers written, and complex mathematical calculations developed, to try and predict where and when an aircraft or other low probability, high consequence risk might occur. However, none of these efforts have resulted in a consensus or an agreed upon methodology within the risk assessor community.

The methodology of using accident rates as a predictor of the likelihood of a crash is what is commonly used. The accident rates are based upon accidents per 100,000 hours of flight for military aircraft. For commercial aircraft, in general, this expression is a measure of accidents per million departures.

The accident rates for the KC-46A were determined using the accident rate for the B-767 jetliner, which is currently in service. The accident rate for commercial airliners is based upon departures (flight cycles). With takeoffs assumed to be one-half of the total projected departure airfield operations (see operational data contained in Volume I, Chapter 2), the formula $C_r x A_o = 1/X$ (where C_r = crash rate and A_o = departure airfield operations) shows that the frequency of an accident, even with increased operations, is not likely to occur in the foreseeable future.

While it is counterintuitive, an increase in operation tempo (OPTEMPO) may not result in higher accident rates, and no correlation has been proved or disproved. In a 2002 report to Congress on military aviation safety, the Congressional Research Service concluded, “While no correlation between high OPTEMPO and increased mishaps has been proved, it also hasn’t been disproved. A great degree of uncertainty remains. Little is known, for example, of the OPTEMPO effects on maintenance, ammunition, training in country, living conditions, or personnel tempo” (CRS 2002). In other words, there are numerous unpredictable factors that may or may not contribute to an accident.

Bird/Wildlife-Aircraft Strike Hazard (BASH). Bird/wildlife-aircraft strikes constitute a safety concern for the USAF because they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet mean sea level (MSL) or higher. However, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet above ground level (AGL). Approximately 30 percent of bird strikes happen in the airport environment, and almost 55 percent occur during low-altitude flight training (AFSC 2013).

To address the issues of aircraft bird strikes, the USAF has developed the Avian Hazard Advisory System to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the Avian Hazard Advisory System is an online, near real time, geographic information system (GIS) used for bird strike risk flight planning across the continental United States and Alaska. Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics and is combined with key environmental and man-made geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes. The model was created in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required pilot briefings that take place prior to any sortie.

Fuel Jettison. The KC-46A, like the KC-135 aircraft, has the ability to jettison fuel in cases of emergency and non-emergency situations. Data on historical KC-135 operations show that slightly less than two sorties per thousand resulted in a release of fuel (USAF 2013).

The main environmental concern from fuel released from an aircraft is fuel deposition onto the ground and/or surface waters and any possible negative impacts on human health or natural resources. The results of a definitive study on the fate of jettisoned fuel from large USAF aircraft (such as the KC-135) (Deepti 2003) were used to identify a reasonably conservative ground-level fuel deposition value for the KC-46A. This study used the Fuel Jettison Simulation model developed by the USAF to estimate the ground deposition of fuel from jettison events (Teske and Curbishley 2000). This maximum ground-level fuel deposition value identified for the KC-46A would result in effects that are well below known natural resource and human health thresholds for jet fuel. Therefore, the maximum fuel deposition value expected from the KC-46A would not produce substantial or significant impacts on human or natural resources.

It is the policy of the Air Force Major Commands to follow AFIs or supplement those established AFIs. These policies require that pilots avoid fuel jettison, unless safety of flight dictates immediate jettison. For example, AMC policy, which covers all USAF tanker assets, requires that any fuel released from an aircraft must occur above 20,000 feet AGL (AMC 2004, 2012). Similar policy from AETC covers aircrews during training (AFI 11-2KC-135V3). These policies are designed to minimize potential impacts of fuel jettison events. In view of this, no further analysis is included in this section.

B.3.3.2 Ground Safety

Day-to-day O&M activities conducted at AFBs are performed in accordance with applicable USAF safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health requirements. These are intended to standardize procedures and practices in all activities on USAF property to reduce occupational risks to government personnel and contractors and to protect other persons that reside on or visit the base or the vicinity of the base.

Anti-Terrorism/Force Protection. Anti-Terrorism/Force Protection (AT/FP) is a security program designed to protect USAF active-duty personnel, civilian employees, family members, and facilities and equipment in all locations and situations. The program is accomplished through the planned and integrated application of anti-terrorism measures, physical security, operations security, and personal protective services. It is supported by intelligence, counterintelligence, and other security programs. In response to terrorist attacks, several regulations have been promulgated to ensure that force protection standards are incorporated into the planning, programming, and budgeting for the design and construction of Military Construction-funded facilities. Unified Facilities Criteria (UFC) 04-010-01, *DoD Minimum Antiterrorism Standards for Buildings* (published in 2003 and updated in 2007) (DoD 2007) establishes minimum standoff distances that must be maintained between several categories of structures and areas that are relatively accessible to terrorists.

The intent of AT/FP and design guidance is to improve security, minimize fatalities, and limit damage to facilities in the event of a terrorist attack. Many military bases, including those under consideration for beddown of the KC-46A, were developed before such considerations became a critical concern. Thus, under current conditions, many units are not able to completely comply with all present AT/FP standards. However, as new construction and modification of facilities occurs, AT/FP standards would be incorporated to the maximum extent practicable.

Construction/Demolition Safety. Short-term safety risks are associated with any demolition and construction activity, including those activities proposed as part of this action. However, adherence to standard safety practices would minimize any potential risks.

Airfield Safety. Accident potential relies on identifying where most accidents have occurred in the past at military airfields (USAF 2002). This approach does not produce accident probability statistics since the question of probability involves too many variables for an accurate prediction model to be developed. The analysis of the history of military aircraft accidents focuses on determining where (within the airfield environments) an accident is likely to occur and estimates the size of the impact area that is likely to result from any single accident. As per DoDI 4165.57, "AICUZ, Ground Obstructions," all structures on the ground have the potential to create hazards to flight. The Federal Aviation Administration (FAA) provides detailed instructions for the marking of obstructions (i.e., paint schemes and lighting) to warn pilots of their presence. Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet AGL or exceeds any obstruction standard contained in 14 CFR Part 77 should normally be marked and/or lighted. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 CFR Part 77 standards because of its particular location. The obstruction standards in 14 CFR Part 77 are primarily focused on structures in the immediate vicinity of airports and approach and departure corridors from airports (14 CFR 77).

B.4 SOILS AND WATER

B.4.1 RESOURCE DEFINITION

The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment.

Water resources include surface water, groundwater, and floodplains. Surface water resources include lakes, rivers, and streams and are important for a variety of reasons, including economic, ecological, recreational, and human health factors. Groundwater includes the subsurface hydrologic resources of the physical environment; its properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition.

B.4.2 REGULATORY SETTING

The Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 et seq.) and the USEPA Storm Water General Permit regulate pollutant discharges. Pollutants regulated under the CWA include "priority" pollutants, including various toxic pollutants, such as biochemical oxygen demand, total suspended solids, fecal coliform, oil and grease, and pH. Wetlands are discussed under the Biological Resources section below.

Federal agencies are also required to comply with Section 438 of the Energy Independence and Security Act of 2007 (EISA) for any project exceeding 5,000 square feet. Section 438 of the EISA instructs Federal agencies to use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property.

With respect to soil erosion, Section 402(p) of the CWA regulates non-point source discharges of pollutants, under the National Pollutant Discharge Elimination System (NPDES) program, or state equivalent program. This section of the CWA was amended to require the USEPA to establish regulations for discharges from active construction sites. NPDES General Construction Permits require preparation of a Storm Water Pollution Prevention Plan for projects greater than 1 acre.

Prime farmland is protected under the Farmland Protection Policy Act of 1981 (7 CFR 658). Prime farmland is defined as land that has the best combination of physical and chemical

characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pasture, rangeland, or other land, but not urban built-up land (defined by the U.S. Census Bureau, or U.S. Geological Survey topographic maps) or water. The project area at all four bases is classified by the U.S. Census Bureau as urbanized lands.

B.4.3 METHODOLOGY

Impacts on soils and surface water can result from earth disturbance that would expose soil to wind or water erosion. Analysis of impacts on soils and surface water examines the potential for such erosion at each base and describes typical measures employed to minimize erosion. In addition, soil limitations and associated typical engineering remedial measures are evaluated with respect to proposed construction.

Criteria for evaluating impacts related to soil resources associated with implementation of the KC-46A scenarios are impacts on unique soil resources, minimization of soil erosion, and the siting of facilities relative to potential soil limitations. If development proposed in the EIS were to substantially affect any of these features, impacts would be considered significant.

Soil disturbance at each base was calculated by summing the square footages of additions/alterations and new construction.

Criteria for evaluating impacts related to water resources associated with implementation of the KC-46A scenarios are water availability, water quality, adherence to applicable regulations, and existence of floodplains. Impacts are measured by the potential to reduce water availability to existing users; to endanger public health or safety by creating or worsening health hazards or safety conditions; or to violate laws or regulations adopted to protect or manage water resources.

Flooding impacts are evaluated by determining whether proposed construction is located within a designated floodplain. Groundwater impacts are evaluated by determining whether groundwater beneath the project site would be used for implementing the KC-46A mission, and if so, by determining the potential to adversely affect those groundwater resources. Soils and water resource impacts are not evaluated for the areas below where the KC-46A would be operated or at the auxiliary airfields because no ground-disturbing activities or use of water resources would occur at these locations.

B.5 BIOLOGICAL RESOURCES

B.5.1 RESOURCE DEFINITION

Biological resources include the native and introduced terrestrial and aquatic plants and animals found within the region of influence (ROI). The ROI for biological resources is defined as the land area (habitats) and airspace that could potentially be affected by infrastructure and construction projects, as well as airspace operations. The ROI generally includes the developed cantonment and airfield areas of the respective bases, but may also include areas near but outside the base boundary. Examples of off-base areas include managed wildlife areas and surface waters that could be indirectly affected by noise or water quality alteration, respectively. Habitat types are based on floral, faunal, and geophysical characteristics.

Sensitive habitats include areas that the Federal government, state governments, or the DoD have designated as worthy of special protection due to certain characteristics such as high species diversity, special habitat conditions for rare species, or other unique features.

For purposes of analysis, biological resources were organized into four categories: vegetation, wildlife, special-status species, and wetlands. Vegetation includes existing terrestrial plant communities but does not include special-status plants, which are discussed below. Plant species composition within an area generally defines ecological communities and indicates the type of wildlife that may be present.

Wildlife includes all vertebrate animal species, with the exception of special-status species, which are discussed below. Typical wildlife includes animal groups such as large and small mammals, songbirds, waterfowl, reptiles, amphibians, and fish. The attributes and quality of available habitats influences the composition, diversity, and abundance of wildlife communities.

Special-status species are defined as those plant and animal species protected by various regulations established by Federal and state agencies. These regulations, and the species addressed by them, are described in the Regulatory Setting section below.

Wetlands are areas of transition between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water (Mitsch and Gosselink 2000).

B.5.2 REGULATORY SETTING

"Integrated Natural Resources Management," AFI 32-7064, explains how to manage natural resources on USAF property in compliance with Federal, state, and local standards. The chief tool for managing base ecosystems is the Integrated Natural Resources Management Plan (INRMP). Based on an interdisciplinary approach to ecosystem management, the INRMP ensures the successful accomplishment of the military mission by integrating all aspects of natural resources management with each other and the rest of the base's mission.

Special-status plant and wildlife species are subject to regulations under the authority of Federal and state agencies. Special-status species include species designated as threatened, endangered, or candidate species by state or Federal agencies. Under the Endangered Species Act (ESA) (16 U.S.C. 1536), an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future. Candidate species are those species for which the U.S. Fish and Wildlife Service (USFWS) has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher-priority listing activities. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA.

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712) is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to both countries (i.e., species occur in both countries at some point during their annual life cycle). The act protects all migratory birds and their parts (including eggs, nests, and feathers).

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d) is legislation in the United States that protects two species of eagles. The BGEPA prohibits anyone without a permit issued by the Secretary of the Interior from "taking" bald eagles. Taking involves molesting or disturbing birds, their parts, nests, or eggs. The BGEPA provides criminal penalties for persons

who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald or golden eagles... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."

Section 404 of the CWA established a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. The U.S. Army Corps of Engineers (USACE) is the lead agency in protecting wetland resources. This agency maintains jurisdiction over Federal wetlands (33 CFR 328.3) under Section 404 of the CWA (30 CFR 320-330) and Section 10 of the Rivers and Harbors Act (30 CFR 329). The USEPA assists the USACE (in an administrative capacity) in the protection of wetlands (40 CFR 225.1 to 233.71). In addition, the USFWS and the National Marine Fisheries Service provide support with important advisory roles.

Furthermore, Executive Order (EO) 11990, *Protection of Wetlands*, requires Federal agencies, including the USAF, to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. EO 11990 requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative; if construction in wetlands cannot be avoided, the USAF will issue a Finding of No Practicable Alternative.

Under CWA Section 401, applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a Federal component and may affect state water quality (including projects that require Federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401.

The following state agencies issue Section 401 certifications in their respective states: the Department of Environmental Quality in Oklahoma; the Department of Ecology in Washington; the Department of Health, Division of Water Quality, in North Dakota; and the Department of Health and Environment in Kansas.

B.5.3 METHODOLOGY

The first step in the analysis of potential impacts on biological resources was to determine the locations of sensitive habitats and species in relation to the proposed action. Maps were examined to locate sensitive habitats and species, and where necessary, site visits and additional surveys were conducted to confirm locations. Next, areas of overlap for the proposed development and sensitive habitats and species were identified. Scientific literature was reviewed for studies that examined similar types of impacts on biological resources. The literature review included a review of basic characteristics and habitat requirements of each sensitive species. Where available, information was also gathered relative to management considerations, incompatible resource management activities, and threats to each sensitive species. Impact analyses were then conducted based on the information gathered from the literature review. The analyses included an assessment of the impacts on biological resources resulting from both construction activities and daily operations. Measures to avoid and/or minimize adverse impacts

on biological resources are also presented. The following criteria were evaluated when determining the significance of an effect on biological resources resulting from implementation of actions described in Volume I, Chapter 2:

- The direct impact or taking of a protected special-status species, including habitat alteration
- The importance (legal, commercial, ecological, or scientific) of the resource
- The relative sensitivity of biological resources to potential effects of the actions
- The quantity or percentage of biological resources affected by the actions relative to overall abundance in the ROI
- The expected duration of potential impacts resulting from implementation of the actions

Determination of the significance of wetland impacts is based on (1) loss of wetland acreage, (2) the function and value of the wetland, (3) the proportion of the wetland that would be affected relative to the occurrence of similar wetlands in the region, (4) the sensitivity of the wetland to proposed activities, and (5) the duration of ecological ramifications. Impacts on wetland resources are considered significant if high-value wetlands would be adversely affected or if wetland acreage is lost.

B.6 CULTURAL RESOURCES

B.6.1 RESOURCE DEFINITION

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources. Only significant cultural resources are considered for potential adverse impacts from an action. Significant cultural resources are those eligible for inclusion in the National Register of Historic Places (NRHP), as set forth in 36 CFR 60.4, or identified as important to tribes or other traditional groups, as outlined in the American Indian Religious Freedom Act; the Native American Graves Protection and Repatriation Act; and EO 13007, *Indian Sacred Sites*. Historic properties are any prehistoric or historic districts, sites, buildings, structures, or objects included or eligible for inclusion in the NRHP because of their historic or cultural significance. For a cultural resource to be considered eligible for the NRHP, it must possess integrity of location, design, setting, materials, workmanship, feeling, or association, and it must meet one or more of the following criteria (36 CFR 60.4):

- Association with events that have made a significant contribution to the broad patterns of our history (criterion a).
- Association with the lives or persons significant in our past (criterion b).
- Embodiment of distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (criterion c).
- Have yielded, or may be likely to yield, information important in prehistory or history (criterion d).

In general, these resources must be more than 50 years old; however, younger resources may be eligible if they are exceptionally significant.

Section 101(d)(6)(A) of the National Historic Preservation Act (NHPA) states that properties of traditional religious and cultural importance to a tribe or Native Hawaiian organization may be determined to be eligible for inclusion in the NRHP. NRHP Bulletin 38 (NPS 1998) defines traditional cultural property (TCP), generally, as one that is eligible for inclusion in the NRHP. Reasons for eligibility could be because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community. TCPs can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that tribes and other groups consider essential for the continuance of traditional cultures.

However, properties of traditional religious and cultural importance need not be determined eligible for the NRHP to be a significant cultural resource considered for potential adverse impacts from an action. On 21 November 1999, the DoD promulgated its American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis (DoD 1999). The policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and tribal and Alaska Native lands, before decisions are made by the services. DoDI 4710.02, "DoD Interactions with Federally-Recognized Tribes," implements DoD policy, assigns responsibilities, and provides procedures for DoD interactions with federally recognized tribes in accordance with its American Indian and Alaska Native Policy and other DoD directives and policies.

EO 13007 defines *sacred sites* as any specific, discrete, narrowly delineated location on Federal land that is identified by a tribe or individual as sacred by virtue of its established religious significance to or ceremonial use by a tribal religion and identified as such to the land managing agency. EO 13007 also requires agencies to accommodate access to, and ceremonial use of, sacred sites by tribal religious practitioners and to avoid adversely affecting their physical integrity.

B.6.2 REGULATORY SETTING

"Cultural Resources Management," DoDI 4715.16, (DoD 2008), and AFI 32-7065, "Cultural Resources Management," (USAF 2004) outline and specify proper procedures for cultural resource management on USAF bases.

Laws pertinent to the proposed action include the NHPA of 1966, as amended; the Antiquities Act of 1906; the Historic Sites Act of 1935; NEPA; the Archaeological and Historic Preservation Act of 1974; the Archaeological Resources Protection Act of 1979; the Native American Graves Protection and Repatriation Act of 1990; and the American Indian Religious Freedom Act of 1978.

Under Section 106 of the NHPA, the USAF is required to consider the effects of its undertakings at each location on historic properties listed, or eligible for listing, in the NRHP and to consult with the State Historic Preservation Office (SHPO), Tribal Historic Preservation Office, and others regarding potential effects as per 36 CFR 800. Under AFI 32-7065, recorded cultural resources not evaluated for NRHP eligibility must be managed as eligible. Under Section 110 of the NHPA, each location is mandated to maintain an active historic preservation program and provide stewardship of cultural resources "consistent with the preservation of such properties and the mission of the agency (Section 470 h-2(a))."

Federal regulations governing cultural resource activities include the following: 36 CFR 800, *Protection of Historic Properties* (incorporating amendments effective August 5, 2004); 36 CFR 79, *Curation of Federally Owned and Administered Archaeological Collections*; 43 CFR 7, *Protection of Archaeological Resources*; 36 CFR 60, *National Register of Historic Places*; and 36 CFR 63, *Determinations of Eligibility for Inclusion in the National Register*. Cultural resource-related EOs that may affect the locations include the following: EO 11593, *Protection and Enhancement of the Cultural Environment*; EO 13007, *Indian Sacred Sites*; EO 13175, *Consultation and Coordination with Indian Tribal Governments*; and EO 13287, *Preserve America*.

B.6.3 METHODOLOGY

Impact analysis for cultural resources focuses on assessing whether the KC-46A mission would have the potential to affect cultural resources that are eligible for listing in the NRHP or have traditional significance for tribes. For this Final EIS, impact analysis for cultural resources focuses on, but is not limited to, guidelines and standards set forth in NHPA Section 106's implementing regulations (36 CFR 800). Under Section 106 of the NHPA, the proponent of the action is responsible for determining whether any historic properties are located in the area, assessing whether the proposed undertaking would adversely affect the resources, and notifying the SHPO of any adverse effects. An adverse effect is any action that may directly or indirectly change the characteristics that make the historic property eligible for listing in the NRHP. If an adverse effect is identified, the Federal agency consults with the SHPO and federally recognized tribes to develop measures to avoid, minimize, or mitigate the adverse effects of the undertaking.

Analysis of potential impacts on cultural resources considers both direct and indirect impacts.

Impacts may occur through the following:

- Physically altering, damaging, or destroying all or part of a resource
- Altering characteristics of the surrounding environment that contribute to the resource's significance
- Introducing visual or audible elements that are out of character with the property or alter its setting
- Neglecting the resource to the extent that it deteriorates or is destroyed

Direct impacts are assessed by (1) identifying the nature and location of all elements of the proposed action and alternatives; (2) comparing those locations with identified historic properties, sensitive areas, and surveyed locations; (3) determining the known or potential significance of historic properties that could be affected; and (4) assessing the extent and intensity of the effects. Indirect impacts occur later in time or farther from the proposed action. Indirect impacts on cultural resources generally result from the effects of project-induced population increases, such as the need to develop new housing areas, utility services, and other support functions to accommodate population growth, or increased visitation of a remote area due to improved vehicle access. These activities and the subsequent use of the facilities can impact cultural resources.

A key component of this analysis is defining the area of potential effect, defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)).

Archaeological and historic architectural resources at the bases were characterized using existing survey and analysis information from Integrated Cultural Resources Management Plans (ICRMPs), archaeological survey reports, historic buildings survey reports, local histories, and the records of the NRHP and National Historic Landmarks. These documents provided information on known locations of significant resources. In compliance with Section 106 of the NHPA, the USAF consulted with the relevant SHPOs regarding the area of potential effect and potential cultural resource concerns for the proposed action. NRHP-eligible or -listed properties at each base are identified in the base-specific sections.

The potential for traditional resources at the bases was identified using ICRMPS and information provided by base cultural resource management staff. Potentially interested tribes were contacted to request information on potential concerns about the proposed action.

In this analysis, demolition, construction, and other base-specific actions needed to support the KC-46A basing are part of the alternatives. The assessment of adverse effects takes into account both the potential for physical damage or destruction of historic properties at the bases and the potential adverse effects of visual intrusions, noise, and vibration on historic properties at the bases. Properties eligible for inclusion in the NRHP for their scientific information potential generally are not adversely affected by the introduction of auditory or visual intrusions. Conversely, if integrity of setting or feeling is an important element of a property's eligibility, that property may be adversely affected by the introduction of auditory or visual intrusions.

Impacts on properties of traditional religious and cultural importance (hereafter referred to as "traditional cultural resources") can result from noise and visual effects of aircraft overflights on rituals and ceremonies and on wildlife resources. The USAF's ongoing consultation with tribes may identify places of traditional cultural importance or other types of cultural resources that might be adversely affected by auditory or visual intrusions or other elements of the proposed action.

B.7 LAND USE

B.7.1 RESOURCE DEFINITION

Land use describes the way the natural landscape has been modified or managed to provide for human needs. In developed and urbanized areas, land uses typically include residential, commercial, industrial, utilities and transportation, recreation, open space, and mixes of these basic types. Other uses such as mining, extractive activities, agriculture, forestry, and specially protected areas (such as larger monuments, parks, and preserves) are usually found on the fringes or outside of urbanized areas. Plans and policies guide how land resources are allocated and managed to best serve multiple needs and interests. Ordinances and regulations define specific limitations on uses.

The attributes of land use addressed in this analysis include general land use patterns within and surrounding each military base and the land use regulatory setting. The regulatory setting is the framework for managing land use and approving new development. It pertains to Federal, state, and local statutes, regulations, plans, programs, and ordinances.

Region of Influence. The ROI for the land use analyses in this Final EIS includes the land within and surrounding each base. The analysis considers an area that encompasses the full extent of airfield accident zones, and areas exposed to noise levels of concern, plus a reasonable buffer of a few miles. This ROI provides for a wider context of jurisdictional divisions that influence land use patterns around each base.

B.7.2 REGULATORY SETTING

The regulatory setting for land use includes the key Federal, state, and local statutes, regulations, plans, policies, and programs applicable to land use on and near each base. The land use discipline assumed the Federal noise compatibility requirements as identified below.

Airfield and Heliport Planning and Design – DoD UFC 3-260-01. Several siting criteria have been established specific to land development and use at commercial and military airfields. To maintain safety, the USAF adheres to guidelines set forth in UFC 3-260-01, *Airfield and Heliport Planning and Design* (UFC 3-260-01). These criteria include CZs, APZs, and other obstruction zones relative to airfield environments. These and other criteria related to safety, security, and other land use issues are used to assist planners and decision makers with appropriate siting of facilities affecting design and physical layout of USAF bases.

FICUN Land Use Guidelines (1980). In 1980, FICUN was formed to develop Federal policy and guidance on noise. The committee included the USEPA, FAA, Federal Highway Administration, DoD, Department of Housing and Urban Development, and the U.S. Department of Veterans Affairs. The designations contained in the FICUN compatibility table for land use do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities.

Air Installation Compatibility Use Zone (AICUZ) Program (DoDI 4165.57). Establishes the AICUZ program, which is similar to the FAA's Federal Aviation Regulations Part 150 program for civil airports. The AICUZ program is a DoD discretionary program designed to promote compatible land use around military airfields. The military services maintain an AICUZ program to protect the operational integrity of their flying mission.

Areas around airfields are exposed to the potential of aircraft accidents despite well-maintained aircraft with highly trained aircrews. DoD developed the AICUZ program to aid in the development of planning mechanisms that protect the safety and health of personnel on and near military airfields and to preserve operational capabilities. The AICUZ program consists of three distinct parts: APZs, hazards to air navigation (height and obstruction criteria established by the FAA), and noise zones.

Bases use the AICUZ program to provide land use compatibility guidelines for areas exposed to increased safety risks and noise near the airfield. The noise compatibility guidelines recommended in the AICUZ program are similar to those used by the Department of Housing and Urban Development and FAA to provide information to surrounding jurisdictions to guide planning and regulation of land use. When noise levels exceed a DNL of 65 dB, residential land uses are normally considered incompatible.

B.7.3 METHODOLOGY

Potential impacts on land use can result from actions that (1) change the suitability of a location for its current or planned use (e.g., noise exposure in residential areas); (2) cause conditions that are unsafe for the public welfare; (3) conflict with the current and planned use of the area based on current zoning, amendments, agreements, regulatory restrictions, management, and land use plans; or (4) displace a current use with a use that does not meet the goals, objectives, and desired use for an area based on public plans or resolutions. The degree of land use effects (negligible, minor, moderate, or significant) is based on the level of land use sensitivity in areas

affected by a proposed action, the magnitude of change, and the compatibility of a proposed action with existing or planned land uses. The assessment considers multiple contextual factors that are both quantified and qualitative.

The evaluation primarily focuses on changes resulting from the action that may affect off-base areas. Also considered are potential effects on community amenities within the base such as schools, child care facilities, and housing areas. For each scenario, the following land use impact drivers are considered:

- Construction and demolition on base (effects such as temporary dust, noise and traffic and longer-term noise or visual changes affecting community areas and nearby off-base locations). The assessment considers the extent of redevelopment, duration, and proximity to sensitive locations of on-base and off-base areas.
- O&M activities for the new mission (generating noise, odors, or traffic). The assessment considers whether the action involves any unusual or new activities, and proximity to sensitive locations of on-base and off-base areas.
- Aircraft operations at the base and in the surrounding area, including engine run ups, takeoffs and landings, and closed pattern work. The assessment evaluates changes in noise exposure levels and the location of noise relative to existing land use, planned uses, and zoning, focusing on land use compatibility with projected noise levels and accident potential following DoD guidelines.
- Change in base population (causing indirect impacts such as congestion in nearby neighborhoods).

The following steps are used to evaluate the impacts on land use from the proposed alternatives:

1. Characterize and describe existing land use and conditions (Volume I, Chapter 3).
    - Describe general context for the base in the local area (whether urbanized, rural, or natural) and describe jurisdictional boundaries within the area around the airfield.
    - Describe the overall organization of functions on the base (using site plans, Base General Plans, other NEPA documents).
    - Describe the land use setting surrounding the base, using aerial photography (National Agriculture Imagery Program [NAIP] 1-meter aerial imagery), notes from site visits, land use plans by local jurisdictions, current zoning.
    - Describe current compatibility planning efforts for the base and status of compatibility around the airfield (based on AICUZ studies, Joint Land Use Studies, airfield zoning districts, airfield noise complaint logs).
    - Identify current noise exposure for land uses surrounding the airfield (using maps with baseline noise contours superimposed on aerial photography), describe noise levels affecting current uses and compatibility of the current exposure levels, and identify specific sensitive receptors affected by incompatible noise levels (such as schools and child development centers) based on the DoD noise compatibility guidelines.
2. Evaluate effects on land use of new construction and demolition. The analysis considers direct and indirect effects of redevelopment based on size of construction effort, location of projects relative to sensitive uses (for example, new industrial-type functions relative to family housing areas), and duration of construction.

3. Evaluate effects on land use of new O&M activities. Qualitatively consider if changes in O&M activities can have indirect effects on the suitability of areas outside the base for their current or planned uses. These effects may include dust, noise, traffic, visual modifications.
4. Assess whether any induced changes such as new housing demands in the local area pose any particular concerns for land use.
5. Quantify and locate changes in noise exposure from aircraft operations.
    - Estimate change in acreage of land on and off the base exposed to noise levels of 65 dB DNL and greater at 5 dB intervals. Consider the relative degree of change in exposure in the surrounding area.
    - Overlay projected and baseline noise contours on aerial photographs to locate where changes in noise exposure would occur. Identify projected noise exposure for land uses surrounding the airfield (using maps with baseline noise contours superimposed on aerial photography). Describe where the changes occur, what land use is affected, degree of change (decibel increase), and compatibility of the land use with the change.
    - Where changes in exposure interact with incompatible land use, a more careful evaluation of the zoning and potential future development of the affected area is included. This considers potential for future changes in land use or infill that could heighten an existing incompatible condition. Where residential land is impacted, review of aerial photography and zoning ordinances is used to determine the relative density of homes and potential for future infill. The analysis also identifies how and if current noise compatibility planning is adequate to protect airfield and community interests.
6. The impact assessment considers the degree or intensity of projected accident risk at the airfield in combination with current or possible future incompatible uses in the APZs (context). The analysis rates the degree of existing land use compatibility in the CZs and APZs based on DoD's land use compatibility guidelines using levels of incompatible land uses and occupied structures within the APZs and CZs. Because accident risk is extremely low, the current condition of land use compatibility in the APZs and CZs is the dominant criteria in assessing impacts on land use.

B.8 INFRASTRUCTURE

B.8.1 RESOURCE DEFINITION

Infrastructure consists of the systems and physical structures that enable the population of a USAF base to function. Infrastructure is primarily human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban, or developed built environment. The availability of infrastructure and its capacity for expansion are essential to the ability of the base to carry out a specific mission, operations, and provide for the needs of the employees and residents.

Utilities analyzed for each of the four bases in this Final EIS include water supply and distribution, sanitary sewer and wastewater systems, stormwater drainage, electrical system, natural gas, solid waste, and transportation. Solid waste management primarily relates to the availability of systems and landfills to support a population's residential, commercial, and

industrial needs. AFI 32-7042, "Waste Management," incorporates the requirements of Subtitle D, 40 CFR 240 through 244, 257, and 258, applicable Federal regulations, AFIs, and DoD directives. It also establishes the requirement for bases to have a solid waste management plan; procedures for handling, storage, collection, and disposal of solid waste; record keeping and reporting; and pollution prevention (USAF 2009). The infrastructure information contained in this section provides a brief overview of each infrastructure component and describes its capacities, effectiveness, deficiencies, and existing general condition.

Transportation infrastructure includes the public roadway network, public transportation systems, airports, railroads, pedestrian/bicycle facilities, and waterborne transportation required for the movement of people, materials, and goods. The proposed action has the potential to impact the public roadways that provide access to the bases, base access control points or gates, and the internal roadway systems of the bases. Roadways are typically assigned a functional classification by state departments of transportation. Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. The three main functional classifications for roadways include:

- Arterial – These roadways provided mobility so traffic can move from one place to another quickly and safely.
- Collector – These roadways link arterials and local roads and perform some of the duties of each.
- Local – These roadways provide access to homes, businesses, and other property.

B.8.2 REGULATORY SETTING

There is no applicable regulatory setting for infrastructure and transportation resources.

B.8.3 METHODOLOGY

Effects on infrastructure were evaluated for the KC-46A FTU and MOB 1 scenarios based on the potential for disruption or improvement of existing levels of service and additional needs for water, energy and natural gas consumption, wastewater and stormwater drainage systems, and solid waste system availability. Changes in population and proposed development were used to determine impact on infrastructure. For each scenario, the maximum demand or impact to capacity was calculated for the potable water, wastewater, electric and natural gas systems based on the change in population. For the transportation analysis, any change in population was assumed to reside off base.

The impact analysis consisted of a quantitative assessment, based on available information for average and peak use and demand data for each on-base utility and the ability of a utility provider to absorb a given level of demand increase for its service area, and a qualitative assessment of the physical condition of each on-base system. Impacts might arise from physical changes to utility supply and distribution systems over their design life cycle and energy needs created by either direct or indirect workforce and population changes related to base activities. An effect would be considered adverse if the proposed FTU or MOB 1 scenario requirements caused any of the following:

- A violation of a permit condition or contract with a utility provider
- A capacity exceedance of a utility or solid waste facility

- If a system could not sustain a mission increase due to poor condition, inefficient function, or operation
- If a mission increase would require costly upgrades
- A long-term interruption of a utility

To assess the potential environmental consequences associated with transportation resources, increased utilization of the existing roadway system and base access gates due to the potential increase of personnel is analyzed, as well as potential effects of construction activities. Impacts could arise from physical changes to circulation, construction-related traffic delays, and changes in traffic volumes. Adverse impacts on roadway capacities would be significant if roads with no history of capacity exceedance had to operate at or above their full design capacity as a result of implementation of the KC-46A scenarios.

B.9 HAZARDOUS MATERIALS AND WASTE

B.9.1 RESOURCE DEFINITION

The terms “hazardous materials” and “hazardous waste” refer to substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristic, may present substantial danger to public health or the environment when released into the environment.

Products containing hazardous materials that may result in the generation of hazardous waste include aviation fuel, adhesives, sealants, conversion coatings, corrosion preventative compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, and cleaners.

B.9.2 REGULATORY SETTING

The key Federal regulatory requirements related to hazardous materials and waste include:

- Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.)
- Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. 11001-11050)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601-9675)
- Community Environmental Response Facilitation Act of 1992 (42 U.S.C. 9620)
- Asbestos Hazard Emergency Response Act (15 U.S.C. 2651)
- Spill Prevention, Control and Countermeasure Rule (40 CFR 112)
- USEPA Regulation on Identification and Listing of Hazardous Waste (40 CFR 261)
- USEPA Regulation on Standards for the Management of Used Oil (40 CFR 279)
- USEPA Regulation on Designation, Reportable Quantities, and Notification (40 CFR 302)
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*
- Toxic Substances Control Act of 1976 (40 CFR 700–766)
- Clean Air Act of 1970, including the 1990 Clean Air Act Amendments (40 CFR 61)

Several USAF regulations address the management and safe handling of hazardous materials and wastes in accordance with applicable Federal and state regulations. These include:

- AFI 32-7086, “Hazardous Material Management”
- AFI 32-7042, “Solid and Hazardous Waste Compliance”
- AFI 32-1052, “Facility Asbestos Management”

B.9.3 METHODOLOGY

The exact amounts of hazardous waste that would be generated under each scenario are unknown at this time. The qualitative and quantitative assessment of impacts from hazardous materials and waste management focuses on how (context) and to what degree (intensity) each location could affect hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal. Potential impacts related to hazardous materials and wastes were analyzed for the following five effects:

1. Generation of hazardous material/waste types or quantities could not be accommodated by the current management system.
2. Increased likelihood of an uncontrolled release of hazardous materials that could contaminate the soil, surface water, groundwater, or air.
3. Non-compliance with applicable Federal and state regulations as a result of the proposed action.
4. Disturbance or creation of contaminated sites, resulting in adverse effects on human health and/or the environment.
5. Established management policies, procedures, and handling capacities could not accommodate the proposed action.

B.10 SOCIOECONOMICS

B.10.1 RESOURCE DEFINITION

Socioeconomics refers to features or characteristics of the social and economic environment. The main concern for socioeconomic resources is the change in personnel associated with the KC-46A FTU and MOB 1 scenarios that could potentially impact population, employment, earnings, housing, education, and public services.

B.10.2 REGULATORY SETTING

There is no applicable regulatory setting for socioeconomics.

B.10.3 METHODOLOGY

The socioeconomic analysis focuses on the effects resulting from the personnel changes, as well as construction and/or operation and maintenance under each scenario. To estimate the changes in population to the ROI, the total number of military personnel, military dependents and family members, and students (if any) as indicated in the personnel tables in Volume I, Chapter 2 (Tables 2-4, 2-7, 2-10, 2-13, 2-16, 2-19) were added together and assumed to be migrating to the area. For this analysis, any DoD civilians, part-time Reservists, or contractors (other base personnel) identified in Volume I, Chapter 2, associated with the KC-46A FTU scenario, MOB 1 scenario, or KC-135 mission were assumed to be from the local population and were not considered to be incoming personnel. Therefore, under these assumptions, the changes to the

number of DoD civilians, part-time Reservists, and contractors would not impact population, housing, education, or public services.

To determine the change in on-base jobs, the total change in full-time military personnel, students (if any), DoD civilians, and contractors was added to the existing on-base total work force. Part-time Reservists were not considered to be part of the work force since the Air Force Reserves typically only serve one weekend per month, in any areas they choose to live, and are on temporary duty assignment two weeks a year. For this reason, any change in the number of part-time Reservists associated with each scenario was also not considered as part of the incoming population that would impact housing, economic activity, education, public services, and base services.

The economic impact analysis used to determine the effect of construction and operation and maintenance costs (if any) was conducted using the Impact Analysis for Planning (IMPLAN) economic forecasting model. The IMPLAN model uses data from the U.S. Bureau of Labor Statistics and the U.S. Bureau of Economic Analysis to construct a mathematical representation of the local economics using the region-specific spending patterns, economic multipliers, and industries (MIG 2012). In this analysis, the IMPLAN model provided representations of the county-wide economy at each location. Economic impacts are analyzed by introducing a change to a specific industry in the form of increased or decreased employment or spending; the IMPLAN model mathematically calculates the resulting changes in the local economy. In this analysis, the IMPLAN model estimates the economic effects of the incoming personnel on spending and employment in the established ROI. The economic impacts analysis separates effects into three components: direct, indirect, and induced. Direct effects are the change in employment and income generated directly by the expenditures of the incoming or outgoing personnel. To produce the goods and services demanded by the incoming personnel, businesses, in turn, may need to purchase additional goods and services from other businesses. The employment and incomes generated by these secondary purchases would result in the indirect effects. Induced effects are the increased household spending generated by the direct and indirect effects. The overall effect from the economic impact analysis is the total number of jobs created throughout the ROI by the direct, indirect, and induced effects. The construction and O&M costs used in the economic activity section were provided by the USAF during the site survey reports.

To determine whether the local housing market could support the personnel associated with the FTU or MOB 1 scenarios, several assumptions were made. The first assumption was that DoD civilians, part-time Reservists, and contractors were already residing in the local population and any change to the number of these personnel would not influence the local housing market. The second assumption was that the total number of homes required off base was equal to the total number of incoming full-time military personnel. This number was compared against the number of vacant housing units as defined by the 2010 census. If the number of incoming full-time military personnel did not exceed the number of vacant housing units as defined by the 2010 census, the housing market in the ROI was anticipated to be able to support the incoming population.

Students assigned to the FTU would be assumed to be in transient status. Of the 200 students associated with the FTU scenario, 180 students would be lodged in either on base or off base facilities. The other 20 students would be assumed to be non-prior service Airmen, and would thus be required to live in an on base dormitory. Therefore, under each of the FTU scenarios, there would be a potential need for 180 lodging units on or off base and 20 dormitory units on base to support the average daily student load of 200.

To determine the total dependents for each base associated with the KC-46A mission and KC-135 drawdown mission (where appropriate), 65 percent of all full-time military personnel, as identified in the personnel tables in Volume I, Chapter 2 (See Tables 2-4, 2-7, 2-10, 2-13, 2-16, 2-19), were assumed to be accompanied. Each accompanied military member was assumed to be accompanied by 2.5 dependents, or 1 spouse and approximately 1.5 children. All children were assumed to be of school age. Therefore, to determine the total number of school-aged children, a multiplier of 1.5 was applied to 65 percent of the full-time military personnel.

Public services were analyzed by considering the overall percentage change to the county population. Base services were analyzed by considering the capacity, staffing, and infrastructure available to support the incoming personnel.

The magnitude of potential impacts can vary greatly, depending on the location of the proposed action. If potential socioeconomic changes were to result in substantial shifts in population trends or a decrease in regional spending or earning patterns, those effects would be considered adverse. A proposed action could have a significant effect with respect to socioeconomic conditions in the surrounding ROI if the following were to occur:

- Change in the local business volume, employment, or population that exceeds the ROI's historical annual change
- Adverse change on social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates

B.11 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

B.11.1 RESOURCE DEFINITION

The resource considered for environmental justice is potentially affected populations that meet certain characteristics based on race, income, and age. The resource is defined relatively, in order to understand if impacts from an action are occurring in areas that are disproportionately composed of minorities, low-income persons, and children. This concern arises because large impact projects have historically used sites where real estate values are lower and/or more industrialized. Locations with low property values have tended to attract development of affordable and marginal housing. This dynamic tends to perpetuate and often pre-dates the enactment of community land use ordinances. The intent of environmental justice is to reduce the burden of impacts on socially and economically vulnerable populations.

B.11.2 REGULATORY SETTING

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, EO 12898, directs Federal agencies to address environmental and human health conditions in minority and low-income communities. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs Federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

USAF guidance for implementation of the EO is contained in the *Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process*, dated November 1997 (CEQ 1997). Minority populations include all persons identified by the 2010 census to be of Hispanic origin, regardless of race, and all persons not of Hispanic origin other than White (i.e., non-Hispanic persons who are Black, American Indian, Eskimo or Aleut, Asian or Pacific Islander, or other race).

The 2010 census did not collect information on income or poverty levels. The latest information on poverty was released in 2012 as a 5-year average from 2007 to 2011 as part of the American Community Survey. Low-income populations include persons living below the poverty level. The poverty level or threshold varies by size of family and number of children under 18 years (i.e., $23,021 for a family of four in 2011). If the total family income is less than the threshold, then the family and every individual in it (or unrelated individuals) is in poverty. The percentage of low-income persons is calculated as a percentage of all persons for whom the U.S. Census Bureau determines poverty status, which is generally a slightly lower number than the total population, as it excludes institutionalized persons, persons in military group quarters and in college dormitories, and unrelated individuals under 15 years old.

B.11.3 METHODOLOGY

Analysis of environmental justice focuses on potentially unavoidable significant adverse impacts on any of the resource areas evaluated in this Final EIS. If no potentially significant impacts are identified, an evaluation of environmental justice is not triggered. Where potentially significant impacts are identified in the EIS, the percentages of low-income persons, minority persons, and children under 18 are calculated for the population of the affected area. These percentages are compared to those of the region of comparison to determine if the affected population is disproportionately composed of low-income persons, minority persons, and children under age 18 (i.e., higher than the region of comparison).

Since the proposed construction activities would occur within the base boundaries, the only action with the potential to cause adverse impacts is related to the new noise levels generated in the vicinity of each of the bases under consideration for the FTU or MOB 1 actions. Therefore, the ROI for the environmental justice analysis in this Final EIS uses the county as the region of comparison, and focuses on the demographics of specific affected populations for each of the bases evaluated. Should the analysis of impacts in the EIS conclude that a potentially unavoidable significant impact could occur, the composition of the affected population (i.e., percentages of low-income, minority, and children under age 18) is compared to the region (i.e., the county) to assess if the impact is borne disproportionately by minorities, low-income persons, or children.

For the purposes of this analysis, children are defined as persons age 17 and younger, as enumerated by the 2010 census. For the purposes of this analysis, the proportion of affected low-income population in the 2000 census is evaluated to the census tract level. That percentage is then applied to the affected 2010 population as an estimate of the number of low-income persons affected under the 2010 census. The proportion of affected minority and children under 18 in the 2000 census is evaluated to the census block level, and then applied to the affected 2010 population.

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AFI 32-7086 – Hazardous Material Management

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14 CFR 77 – Objects Affecting Navigable Airspace

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36 CFR 79 – Curation of Federally Owned and Administered Archaeological Collections

36 CFR 800 – Protection of Historic Properties

36 CFR 800.16(d) – Definition of Area of potential effects

40 CFR 61 – National Emission Standards for Hazardous Air Pollutants

40 CFR 93, Subpart B – Determining Conformity of General Federal Actions to State or Federal Implementation Plans

40 CFR 112 – Oil Pollution Prevention

40 CFR 225.1 to 233.71 – Ocean Dumping

40 CFR 261 – EPA Regulation on Identification and Listing of Hazardous Waste

40 CFR 279 – EPA Regulation on Standards for the Management of Used Oil

40 CFR 302 – EPA Regulation on Designation, Reportable Quantities, and Notification

40 CFR Parts 700-766 – Toxic Substances Control Act of 1976

40 CFR 1508.27(b) – Council on Environmental Quality

43 CFR 7 – Protection of Archaeological Resources

Department of Defense Instructions

DoDI 4165.57 – AICUZ, Ground Obstructions

DoDI 4710.02 – DoD Interactions with Federally-Recognized Tribes

DoDI 4715.16 – Cultural Resources Management

DoDI 6055.12 – Occupational Noise and Hearing Conservation Program

Executive Orders

EO 11593, Protection and Enhancement of the Cultural Environment

EO 11990, Protection of Wetlands

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 13007, Indian Sacred Sites

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks

EO 13175, Consultation and Coordination with Indian Tribal Governments

EO 13287, Preserve America

EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance

United States Code

15 U.S.C. 2651, Asbestos Hazard Emergency Response Act of 1986

16 U.S.C. 668 – 668d, Bald and Golden Eagle Protection Act of 1940

16 U.S.C. 703 – 712, Migratory Bird Treaty Act of 1918

16 U.S.C. 1536, Endangered Species Act of 1973

33 U.S.C. 1251 et seq., Clean Water Act of 1977

42 U.S.C. 6901, Resource Conservation and Recovery Act of 1976

42 U.S.C. 7506(c) Transportation Conformity of the Clean Air Act

42 U.S.C. 9601-9675, Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986

42 U.S.C. 9620, Community Environmental Response Facilitation Act of 1992

42 U.S.C. 11001-11050, Emergency Planning and Community Right-to-Know Act of 1986

APPENDIX C

BACKGROUND INFORMATION FOR THE NOISE ANALYSIS

APPENDIX C BACKGROUND INFORMATION FOR THE NOISE ANALYSIS

This appendix provides a general noise primer to educate the reader on what constitutes noise, how it is measured, and the studies that were used in support of how and why noise is modeled.

Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects.

This appendix describes how sound is measured and summarizes noise impacts in terms of community acceptability and land use compatibility; gives detailed descriptions of the effects of noise that lead to the impact guidelines presented; and provides a description of the specific methods used to predict aircraft noise, including a detailed description of sonic booms.

C.1 NOISE DESCRIPTORS AND IMPACT

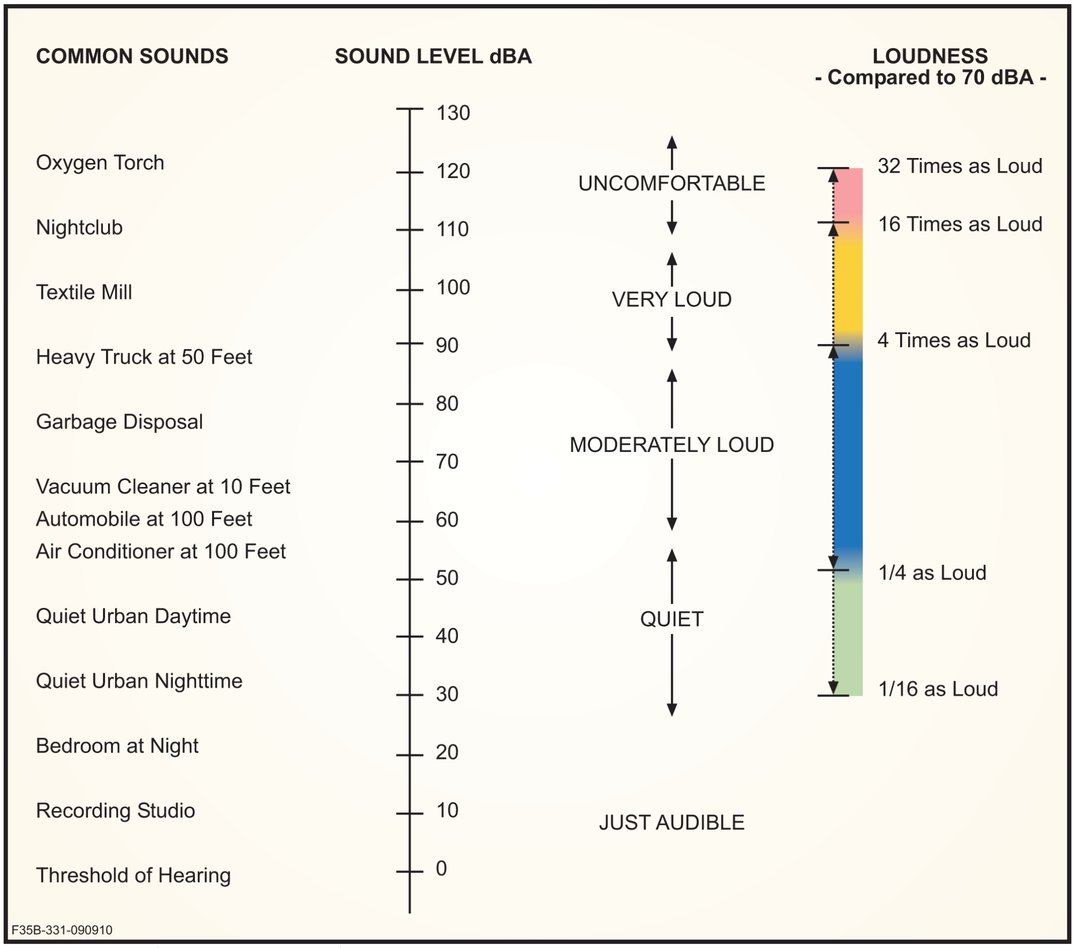
The following subsections describe the characteristics used to describe sound, the specific noise metrics used for noise impact analysis, and how environmental impact and land use compatibility are judged in terms of these quantities.

C.1.1 QUANTIFYING SOUND

Measurement and perception of sound involve two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Because sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or hertz (Hz).

Amplitude. The loudest sounds the human ear can comfortably hear have acoustic energy one trillion times the acoustic energy of sounds the ear can barely detect. Because of this vast range, attempts to represent sound amplitude by pressure are generally unwieldy. Sound is, therefore, usually represented on a logarithmic scale with a unit called the decibel (dB). Sound measured on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Figure C-1 is a chart of A-weighted sound levels from typical sounds. Some (air conditioner, vacuum cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle passby. Some (urban daytime, urban nighttime) are averages over some extended period.



Source: Derived from the Handbook of Noise Control, Harris 1979, FICAN 1997.

Figure C-1. Typical A-Weighted Sound Levels of Common Sounds

Because of the logarithmic nature of the decibel scale, sounds levels do not add and subtract directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that the combination of decibel values consists of first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The difference in decibels between two sounds represents the ratio of the amplitudes of those two sounds. Because human senses tend to be proportional (i.e., detect whether one sound is

twice as big as another) rather than absolute (i.e., detect whether one sound is a given number of pressure units bigger than another), the decibel scale correlates well with human response.

Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound *intensity* but only a 50 percent decrease in perceived *loudness* because of the nonlinear response of the human ear (similar to most human senses).

The one exception to the exclusive use of levels, rather than physical pressure units, to quantify sound is in the case of sonic booms. Sonic booms are coherent waves with specific characteristics. There is a long-standing tradition of describing individual sonic booms by the amplitude of the shock waves, in pounds per square foot. This is particularly relevant when assessing structural effects as opposed to loudness or cumulative community response. In this environmental analysis, sonic booms are quantified by either decibels or pounds per square foot, as appropriate for the particular impact being assessed.

Frequency. The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (ANSI 1988). Sound levels that have been so adjusted are referred to as A-weighted sound levels.

The audible quality of high-thrust engines in modern military combat aircraft can be somewhat different than other aircraft, including (at high throttle settings) the characteristic nonlinear crackle of high-thrust engines. The spectral characteristics of various noises are accounted for by A-weighting, which approximates the response of the human ear but does not necessarily account for quality. There are other, more detailed, weighting factors that have been applied to sounds. In the 1950s and 1960s, when noise from civilian jet aircraft became an issue, substantial research was performed to determine what characteristics of jet noise were a problem. The metrics Perceived Noise Level and Effective Perceived Noise Level were developed. These accounted for nonlinear behavior of hearing and the importance of low frequencies at high levels, and for many years airport/airbase noise contours were presented in terms of Noise Exposure Forecast, which was based on Perceived Noise Level and Effective Perceived Noise Level. In the 1970s, however, it was realized that the primary intrusive aspect of aircraft noise was the high noise level, a factor that is well represented by A-weighted levels and day-night average sound level (DNL). The refinement of Perceived Noise Level, Effective Perceived Noise Level, and Noise Exposure Forecast was not significant in protecting the public from noise.

There has been continuing research on noise metrics and the importance of sound quality, sponsored by the U.S. Department of Defense (DoD) for military aircraft noise and by the Federal Aviation Administration (FAA) for civil aircraft noise. The metric L_{dnmr}, which is described later and accounts for the increased annoyance of rapid onset rate of sound, is a product of this long-term research.

The amplitude of A-weighted sound levels is measured in decibels. It is common for some noise analysts to denote the unit of A-weighted sounds by dBA. As long as the use of A-weighting is understood, there is no difference between dB or dBA: it is only important that the use of A-weighting be made clear. In this environmental analysis, A-weighted sound levels are reported as dB.

Time Averaging. Sound pressure of a continuous sound varies greatly with time, so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the display of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or 1 second (slow). The formal definitions of fast and slow levels are somewhat complex, with details that are important to the makers and users of instrumentation. They may, however, be thought of as levels corresponding to the root mean square sound pressure measured over the 1/8-second or 1-second periods.

C.1.2 NOISE METRICS

C.1.2.1 Sound Exposure Level

Individual time-varying noise events have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. Although the maximum sound level reached during the event provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The Sound Exposure Level (abbreviated SEL or L_{AE} for A-weighted sounds) combines both of these characteristics into a single metric.

SEL is a composite metric that represents both the intensity of a sound and its duration. Mathematically, the mean square sound pressure is computed over the duration of the event, then multiplied by the duration in seconds, and the resultant product is turned into a sound level. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. Table C-1 shows SEL values corresponding to representative aircraft in the specified power settings and aircraft configurations.

Table C-1. Representative Sound Exposure Levels

Aircraft (engine type)	Power Setting	Power Unit	SEL Values (in dBA) At Varying Distances (in feet)				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	102.6	96.2	88.5	76.9	68.3
B-1	97.5%	RPM	129.5	123.1	116.5	107.3	99.3
F-15 (P220)	90%	NC	117.3	112	106.1	97	88.4
F-16 (P229)	93%	NC	116.5	110.8	104.6	95	86.3
F-22	100%	ETR	124.2	118.7	112.7	103.5	95.2
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97.9	91.5	83.3	67	55
B-1	90%	RPM	103.4	98.3	92.7	83.4	74.4
F-15 (P220)	75%	NC	94.2	89.2	83.6	74.9	66.9
F-16 (P229)	83.5%	NC	97.4	92.1	86.3	76.9	68.2
F-22	43%	ETR	114.9	109.3	103.1	93.5	84.5

Key: Engine Units of Power: ETR = engine thrust ratio; NC = engine core revolutions per minute; NF = engine fan revolutions per minute; RPM = revolutions per minute
Source: SELCalc2 (Flyover Noise Calculator), Using NoiseMap 6/7 and Maximum Omega10 Result as the defaults.

C.1.2.2 Day-Night Average Sound Level

Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10 dB penalty to events that occur after 10:00 P.M. and before 7:00 A.M. If the equivalent continuous sound pressure level (L_{eq}) is computed over a 24-hour period with this nighttime penalty applied, the result is the DNL. DNL is the community noise metric recommended by the U.S. Environmental Protection Agency (USEPA) (USEPA 1974) and has been adopted by most Federal agencies (FICON 1992). It has been well established that DNL correlates well with long-term community response to noise (Finegold et al. 1994; Schultz 1978).

DNL accounts for the total, or cumulative, noise impact at a given location, and for this reason is often referred to as a "cumulative" metric. It was noted earlier that, for impulsive sounds, such as sonic booms, C-weighting is more appropriate than A-weighting. DNL computed with C-weighting is denoted CDNL or L_{Cdn}. This procedure has been standardized, and impact interpretive criteria similar to those for DNL have been developed (CHABA 1981).

C.1.2.3 Onset-Adjusted Monthly Day-Night Average Sound Level

Aircraft operations in military training airspace generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occurring at random times and varying from day to day and week to week. This situation differs from most community noise environments, in which noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset.

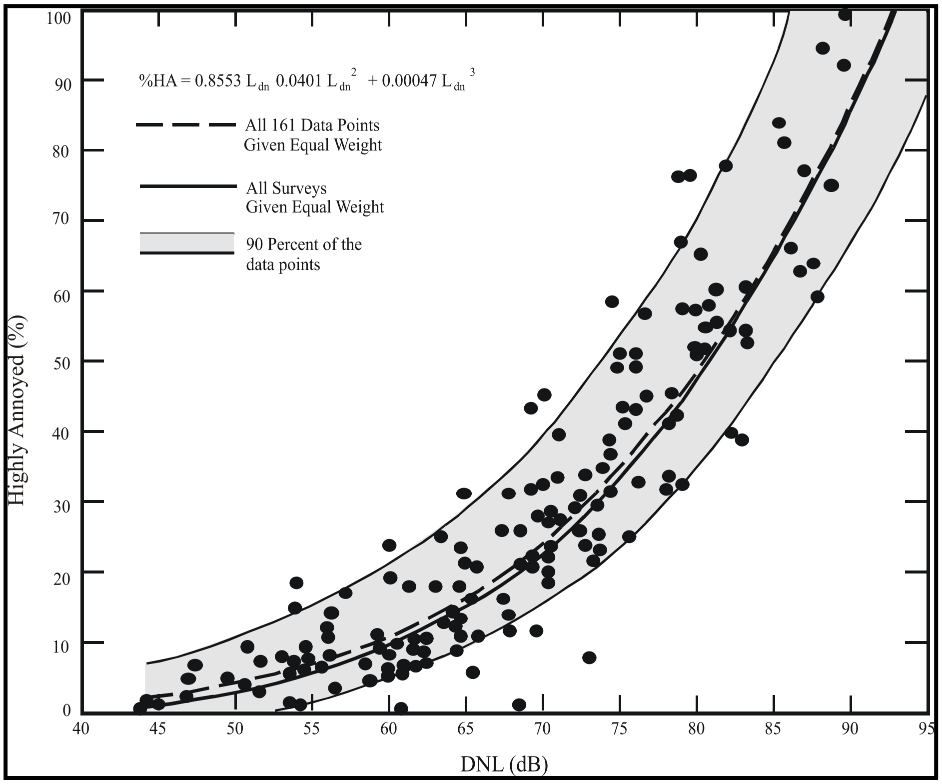
To represent these differences, the conventional DNL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans (Plotkin et al. 1987; Stusnick et al. 1992, 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second require no adjustment. The DNL is then determined in the same manner as for conventional aircraft noise events and is designated as onset-rate adjusted day-night average sound level (abbreviated L_{dnmr}).

Because of the irregular occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The monthly average is denoted L_{dnmr}. Noise levels are calculated the same way for both DNL and L_{dnmr}. L_{dnmr} is interpreted by the same criteria as used for DNL.

C.1.3 NOISE IMPACT

C.1.3.1 Community Reaction

Studies of long-term community annoyance to numerous types of environmental noise show that DNL correlates well with the annoyance. Schultz (1978) showed a consistent relationship between DNL and annoyance. Shultz's original curve fit (Figure C-2) shows that there is a remarkable consistency in results of attitudinal surveys which relate the percentages of groups of people who express various degrees of annoyance when exposed to different DNL.



Source: Schultz 1978.

Figure C-2. Community Surveys of Noise Annoyance

Another study reaffirmed this relationship (Fidell et al. 1989). Figure C-3 shows an updated form of the curve fit (Finegold et al. 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. For example, individuals with autism are often very strongly affected by sudden noises (Tang et al. 2002). Persons with autism often report experiencing oversensitivity to noise and are often particularly sensitive to high-pitched or sudden onset noises (Grandin 1991). Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. DNL accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community (ANSI 1980, 1988, 2005; FICON 1992; FICUN 1980; USEPA 1974).

While DNL is the best metric for quantitatively assessing cumulative noise impact, it does not lend itself to intuitive interpretation by non-experts. Accordingly, it is common for environmental noise analyses to include other metrics for illustrative purposes. A general indication of the noise environment can be presented by noting the maximum sound levels that can occur and the number of times per day noise events will be loud enough to be heard. Use of other metrics as supplements to DNL has been endorsed by Federal agencies (FICON 1992).

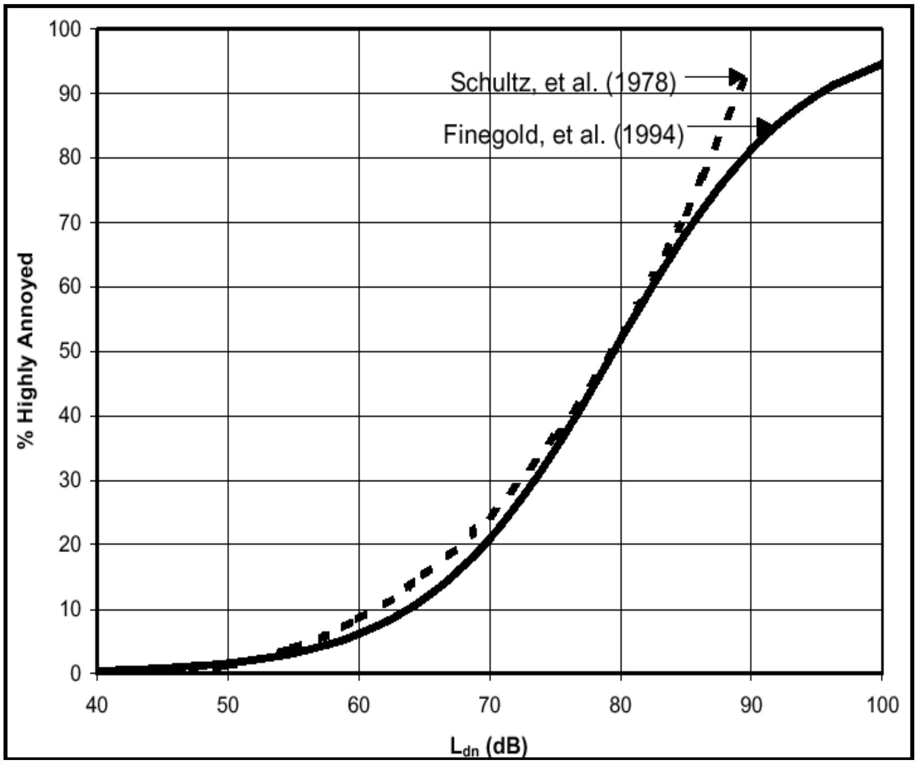


Figure C-3. Response of Communities to Noise; Comparison of Original (Schultz 1978) and Current (Finegold et al. 1994) Curve Fits

The Schultz curve is generally applied to annual average DNL. L_{dnmr} was previously described and presented as being appropriate for quantifying noise in military airspace. The Schultz curve is used with L_{dnmr} as the noise metric. L_{dnmr} is always equal to or greater than DNL, so impact is generally higher than would have been predicted if the onset rate and busiest-month adjustments were not accounted for.

There are several points of interest in the noise-annoyance relation. The first is DNL of 65 dB. This is a level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation, which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. The second is DNL of 55 dB, which was identified by USEPA as a level "...requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1974), which is essentially a level below which adverse impact is not expected. The third is DNL of 75 dB. This is the lowest level at which adverse health effects could be credible (USEPA 1974). The very high annoyance levels correlated with DNL of 75 dB make such areas unsuitable for residential land use. Table C-2 shows the relation between annoyance and DNL.

Table C-2. Relation Between Annoyance and DNL

dB DNL	Percent (%) Highly Annoyed
45	0.83
50	1.66
55	3.31
60	6.48
65	12.29
70	22.10

C.1.3.2 Land Use Compatibility

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL or L_{dnmr} for military overflights.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, the U.S. Department of Transportation, the U.S. Department of Housing and Urban Development, USEPA, and the Veterans Administration. Since the issuance of these guidelines, Federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, DoD and FAA adopted the concept of land use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations (DOT 1984). These guidelines are reprinted in Table C-3, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (note the footnote "*" in the table), they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL values above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases a change in noise level, rather than an absolute threshold, may be a more appropriate measure of impact.

Table C-3. Land Use Compatibility, Noise Exposure, and Accident Potential

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	**Name**	**Clear Zone**	**APZ I**	**APZ II**	**65–69 dB**	**70–74 dB**	**75–79 dB**	**80+ dB**
10	**Residential**							
11	Household units							
11.11	Single units; detached	N	N	Y[a]	A[k]	B[k]	N	N
11.12	Single units; semidetached	N	N	N	A[k]	B[k]	N	N
11.13	Singe units; attached row	N	N	N	A[k]	B[k]	N	N
11.21	Two units; side-by-side	N	N	N	A[k]	B[k]	N	N
11.22	Two units; one above the other	N	N	N	A[k]	B[k]	N	N
11.31	Apartments; walk up	N	N	N	A[k]	B[k]	N	N
11.32	Apartments; elevator	N	N	N	A[k]	B[k]	N	N
12	Group quarters	N	N	N	A[k]	B[k]	N	N
13	Residential hotels	N	N	N	A[k]	B[k]	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	A[k]	B[k]	C[k]	N
16	Other residential	N	N	N[a]	A[k]	B[k]	N	N
20	**Manufacturing**							
21	Food and kindred products; manufacturing	N	N[b]	Y	Y	Y[l]	Y[m]	Y[n]
22	Textile mill products; manufacturing	N	N[b]	Y	Y	Y[l]	Y[m]	Y[n]
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N[b]	Y	Y[l]	Y[m]	Y[n]

Table C-3. Land Use Compatibility, Noise Exposure, and Accident Potential (Continued)

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	Name	Clear Zone	APZ I	APZ II	65-69 dB	70-74 dB	75-79 dB	80+ dB
24	Lumber and wood products (except furniture); manufacturing	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
25	Furniture and fixtures; manufacturing	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
26	Paper and allied products; manufacturing	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
27	Printing, publishing, and allied industries	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
28	Chemicals and allied products; manufacturing	N	N	N[b]	Y	Y[l]	Y[m]	Y[n]
29	Petroleum refining and related industries	N	N	N	Y	Y[l]	Y[m]	Y[n]
30	**Manufacturing**							
31	Rubber and misc. plastic products; manufacturing	N	N[b]	N[b]	Y	Y[l]	Y[m]	Y[n]
32	Stone, clay and glass products; manufacturing	N	N[b]	Y	Y	Y[l]	Y[m]	Y[n]
33	Primary metal industries	N	N[b]	Y	Y	Y[l]	Y[m]	Y[n]
34	Fabricated metal products; manufacturing	N	N[b]	Y	Y	Y[l]	Y[m]	Y[n]
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks; manufacturing	N	N	N[b]	Y	A	B	N
39	Miscellaneous manufacturing	N	Y[b]	Y[b]	Y	Y[l]	Y[m]	Y[n]
40	**Transportation, Communications, and Utilities**							
41	Railroad, rapid rail transit, and street railroad transportation	N[c]	Y[d]	Y	Y	Y[l]	Y[m]	Y[n]
42	Motor vehicle transportation	N[c]	Y	Y	Y	Y[l]	Y[m]	Y[n]
43	Aircraft transportation	N[c]	Y[d]	Y	Y	Y[l]	Y[m]	Y[n]
44	Marine craft transportation	N[c]	Y[d]	Y	Y	Y[l]	Y[m]	Y[n]
45	Highway and street right-of-way	N[c]	Y	Y	Y	Y[l]	Y[m]	Y[n]
46	Automobile parking	N[c]	Y[d]	Y	Y	Y[l]	Y[m]	Y[n]
47	Communications	N[c]	Y[d]	Y	Y	A[o]	B[o]	N
48	Utilities	N[c]	Y[d]	Y	Y	Y	Y[l]	Y[m]
49	Other transportation communications and utilities	N[c]	Y[d]	Y	Y	A[o]	B[o]	N
50	**Trade**							
51	Wholesale trade	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
52	Retail trade-building materials, hardware and farm equipment	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
53	Retail trade-general merchandise	N[b]	N[b]	Y[b]	Y	A	B	N
54	Retail trade-food	N[b]	N[b]	Y[b]	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N[b]	N[b]	Y[b]	Y	A	B	N
56	Retail trade-apparel and accessories	N[b]	N[b]	Y[b]	Y	A	B	N
57	Retail trade-furniture, home furnishings and equipment	N[b]	N[b]	Y[b]	Y	A	B	N
58	Retail trade-eating and drinking establishments	N	N	N[b]	Y	A	B	N
59	Other retail trade	N	N[b]	Y[b]	Y	A	B	N
60	**Services**							
61	Finance, insurance, and real estate services	N	N	Y[f]	Y	A	B	N
62	Personal services	N	N	Y[f]	Y	A	B	N

Table C-3. Land Use Compatibility, Noise Exposure, and Accident Potential (Continued)

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	Name	Clear Zone	APZ I	APZ II	65-69 dB	70-74 dB	75-79 dB	80+ dB
62.4	Cemeteries	N	Y[g]	Y[g]	Y	Y[l]	Y[m]	Y[n,b,a]
63	Business services	N	Y[h]	Y[h]	Y	A	B	N
64	Repair services	N	Y[b]	Y	Y	Y[l]	Y[m]	Y[n]
65	Professional services	N	N	Y[f]	Y	A	B	N
65.1	Hospitals, nursing homes	N	N	N	A*	B*	N	N
65.1	Other medical facilities	N	N	N	Y	A	B	N
66	Contract construction services	N	Y[f]	Y	Y	A	B	N
67	Governmental services	N[f]	N	Y[f]	Y*	A*	B*	N
68	Educational services	N	N	N	A*	B*	N	N
69	Miscellaneous services	N	N[b]	Y[b]	Y	A	B	N
70	**Cultural, Entertainment and Recreational**							
71	Cultural activities (including churches)	N	N	N[b]	A*	B*	N	N
71.2	Nature exhibits	N	Y[b]	Y	Y*	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	A	B	N	N
72.11	Outdoor music shell, amphitheatres	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	N	N	N	Y[q]	Y[q]	N	N
73	Amusements	N	N	Y[h]	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[h,i,j]	Y	Y*	A*	B*	N
75	Resorts and group camps	N	N	N	Y*	Y*	N	N
76	Parks	N	Y[h]	Y[h]	Y*	Y*	N	N
79	Other cultural, entertainment, and recreation	N[i]	Y[i]	Y[i]	Y*	Y*	N	N
80	**Resources Production and Extraction**							
81	Agriculture (except livestock)	Y[p]	Y	Y	Y[r]	Y[s]	Y[t]	Y[t,u]
81.5 to 81.7	Livestock farming and animal breeding	N	Y	Y	Y[r]	Y[s]	Y[t]	Y[t,u]
82	Agricultural-related activities	N	Y[e]	Y	Y[r]	Y[s]	N	N
83	Forestry activities and related services	N[e]	Y	Y	Y[r]	Y[s]	Y[t]	Y[t,u]
84	Fishing activities and related services	N[e]	Y[e]	Y	Y	Y	Y	Y
85	Mining activities and related services	N	Y[e]	Y	Y	Y	Y	Y
89	Other resources production and extraction	N	Y[e]	Y	Y	Y	Y	Y

[a] Suggested maximum density of 1–2 dwelling units per acre possibly increased under a Planned Unit Development where maximum lot coverage is less than 20 percent.

[b] Within each land use category, uses exist where further definition may be needed due to the variation of densities in people and structures. Shopping malls and shopping centers are considered incompatible in any accident potential zone (APZ).

[c] The placing of structures, buildings, or aboveground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones, these items are prohibited. See Air Force Instruction (AFI) 32-7063 and Air Force Manual (AFMAN) 32-1123 for specific guidance.

[d] No passenger terminals and no major aboveground transmission lines in APZ I.

[e] Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.

[f] Low-intensity office uses only. Meeting places, auditoriums, etc., are not recommended.

[g] Excludes chapels.

[h] Facilities must be low intensity.

[i] Clubhouse not recommended.

[j] Areas for gatherings of people are not recommended.

[k] Footnote *k* as applied to noise level reduction (NLR) designation A: Although local conditions may require residential use, it is discouraged in DNL 65–69 dB and strongly discouraged in DNL 70–74 dB. An evaluation should be conducted prior to approvals, indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones, and that there are no viable alternative locations.

Footnote *k* as applied to NLR designation B: Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor NLR for DNL 65–69 dB and DNL 70–74 dB should be incorporated into building codes and considered in individual approvals.

Footnote *k* as applied to NLR designation C: NLR criteria will not eliminate outdoor noise problems. However, building location and site planning and design and use of berms and barriers can help mitigate outdoor exposure, particularly from near ground-level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures that only protect interior spaces.

[l] Measures to achieve the same NLR as required for facilities in the DNL 65–69 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

[m] Measures to achieve the same NLR as required for facilities in the DNL 70–74 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

[n] Measures to achieve the same NLR as required for facilities in the DNL 75–79 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

[o] If noise-sensitive, use indicated NLR; if not, the use is compatible.

[p] No buildings.

[q] Land use is compatible provided special sound reinforcement systems are installed.

[r] Residential buildings require the same NLR required for facilities in the DNL 65–69 dB range.

[s] Residential buildings require the same NLR required for facilities in the DNL 70–74 dB range.

[t] Residential buildings are not permitted.

[u] Land use is not recommended. If the community decides the use is necessary, hearing protection devices should be worn by personnel.

Key: SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation; Y = Yes; land use and related structures are compatible without restriction; N = No; land use and related structures are not compatible and should be prohibited; A, B, or C = Land use and related structures generally compatible; measures to achieve noise level reduction of A (25 dB), B (30 dB), or C (35 dB) should be incorporated into the design and construction of structures; A*, B*, or C* = Land use generally compatible with noise level reduction. However, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes; * = The designation of these uses as "compatible" in this zone reflects individual Federal agency and program consideration of general cost and feasibility factors, as well as past community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

C.2 NOISE EFFECTS

The discussion in the previous section presented the global effect of noise on communities. The following sections describe particular noise effects. These effects include non-auditory health effects, annoyance, speech interference, sleep disturbance, noise-induced hearing impairment, noise effects on animals and wildlife, noise effects on property values, and noise effects on structures, terrain, and cultural resources.

C.2.1 ANNOYANCE

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction on the part of an individual or group (USEPA 1974). As noted in the discussion of DNL above, community annoyance is best measured by that metric.

Because the USEPA Levels Document (USEPA 1974) identified DNL of 55 dB as ". . . requisite to protect public health and welfare with an adequate margin of safety," it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. From a noise exposure perspective, that would be an ideal selection. However, financial resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion that protects those most impacted by noise, and that can often be achieved on a practical basis (FICON 1992). This corresponds to about 12 percent of the exposed population being highly annoyed.

Although DNL of 65 dB is widely used as a benchmark for significant noise impact, and is often an acceptable compromise, it is not a statutory limit, and it is appropriate to consider other

thresholds in particular cases. Local ordinances and regulations have been adopted by many municipal governments to prevent civilian development near military installations that would be incompatible with noise generated by military operations. The decision to adopt such measures, and the specific content of the ordinances and regulations, is up to the municipal government. In many cases, the 65 dB DNL noise contour line is adopted as the threshold level above which land use restrictions are invoked.

C.2.2 SPEECH INTERFERENCE

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Speech is an acoustic signal characterized by rapid fluctuations in sound level and frequency pattern. It is essential for optimum speech intelligibility to recognize these continually shifting sound patterns. Not only does noise diminish the ability to perceive the auditory signal, but it also reduces a listener's ability to follow the pattern of signal fluctuation. In general, interference with speech communication occurs when intrusive noise exceeds about 60 dB (FICON 1992).

Indoor speech interference can be expressed as a percentage of sentence intelligibility among two people speaking in relaxed conversation approximately 3 feet apart in a typical living room or bedroom (USEPA 1974). The percentage of sentence intelligibility is a non-linear function of the (steady) indoor background A-weighted sound level. Such a curve-fit yields 100 percent sentence intelligibility for background levels below 57 dB and yields less than 10 percent intelligibility for background levels above 73 dB. The function is especially sensitive to changes in sound level between 65 dB and 75 dB. As an example of the sensitivity, a 1 dB increase in background sound level from 70 dB to 71 dB yields a 14 percent decrease in sentence intelligibility. The sensitivity of speech interference to noise at 65 dB and above is consistent with the criterion of DNL 65 dB generally taken from the Schultz curve. This is consistent with the observation that speech interference is the primary cause of annoyance.

Classroom Criteria. The effect of aircraft noise on children is a controversial area. Certain studies indicate that, in certain situations, children are potentially more sensitive to noise compared to adults. For example, adults average roughly 10 percent better than young children on speech intelligibility tests in high-noise environments (ASA 2000). Some studies indicate that noise negatively impacts classroom learning (e.g., Shield and Dockrell 2008).

In response to noise-specific and other environmental studies, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (1997), requires Federal agencies to ensure that their policies, programs, and activities address environmental health and safety risks and to identify any disproportionate risks to children. While the issue of noise impacts on children's learning is not fully settled, in May 2009, the American National Standards Institute (ANSI) published a classroom acoustics standard entitled "Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools" (ANSI 2002). At present, complying with the standard is voluntary in most locations. Essentially, the criteria states that when the noisiest hour is dominated by noise from such sources as aircraft, the limits for most classrooms are an hourly average A-weighted sound level of 40 dB, and the A-weighted sound level must not exceed 40 dB for more than 10 percent of the hour. For schools located near airfields, indoor noise levels would have to be lowered by 35–45 dBA relative to outdoor levels (ANSI 2009).

C.2.3 SLEEP DISTURBANCE

Sleep disturbance is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep disturbance may be measured in either of two ways. “Arousal” represents actual awakening from sleep, while a change in “sleep stage” represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the U.S. Air Force (USAF) summarized 21 published studies concerning the effects of noise on sleep (Pearsons et al. 1989). The analysis concluded that a lack of reliable in-home studies, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur under normal community conditions. An extensive study of sleep interference in people’s own homes (Ollerhead et al. 1992) showed very little disturbance from aircraft noise.

There is some controversy associated with these studies, so a conservative approach should be taken in judging sleep interference. Based on older data, the USEPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (USEPA 1974). Assuming an outdoor-to-indoor noise level reduction of 20 dB for typical dwelling units, this corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

A 1984 publication reviewed the probability of arousal or behavioral awakening in terms of SEL (Kryter 1984). Figure C-4, extracted from Figure 10.37 of Kryter (1984), indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects. Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

It was noted in the early sleep disturbance research that the controlled laboratory studies did not account for many factors that are important to sleep behavior, such as habituation to the environment and previous exposure to noise and awakenings from sources other than aircraft noise. In the early 1990s, field studies were conducted to validate the earlier laboratory work. The most significant finding from these studies was that an estimated 80 to 90 percent of sleep disturbances were not related to individual outdoor noise events, but were instead the result of indoor noise sources and other non-noise-related factors. The results showed that there was less of an effect of noise on sleep in real-life conditions than had been previously reported from laboratory studies.

The interim Federal Interagency Committee on Noise (FICON) dose-response curve that was recommended for use in 1992 was based on the most pertinent sleep disturbance research that was conducted through the 1970s, primarily in laboratory settings. After that time, considerable field research was conducted to evaluate the sleep effects in people’s normal, home environment. Laboratory sleep studies tend to show higher values of sleep disturbance than field studies because people who sleep in their own homes are habituated to their environment and, therefore, do not wake up as easily (FICAN 1997).

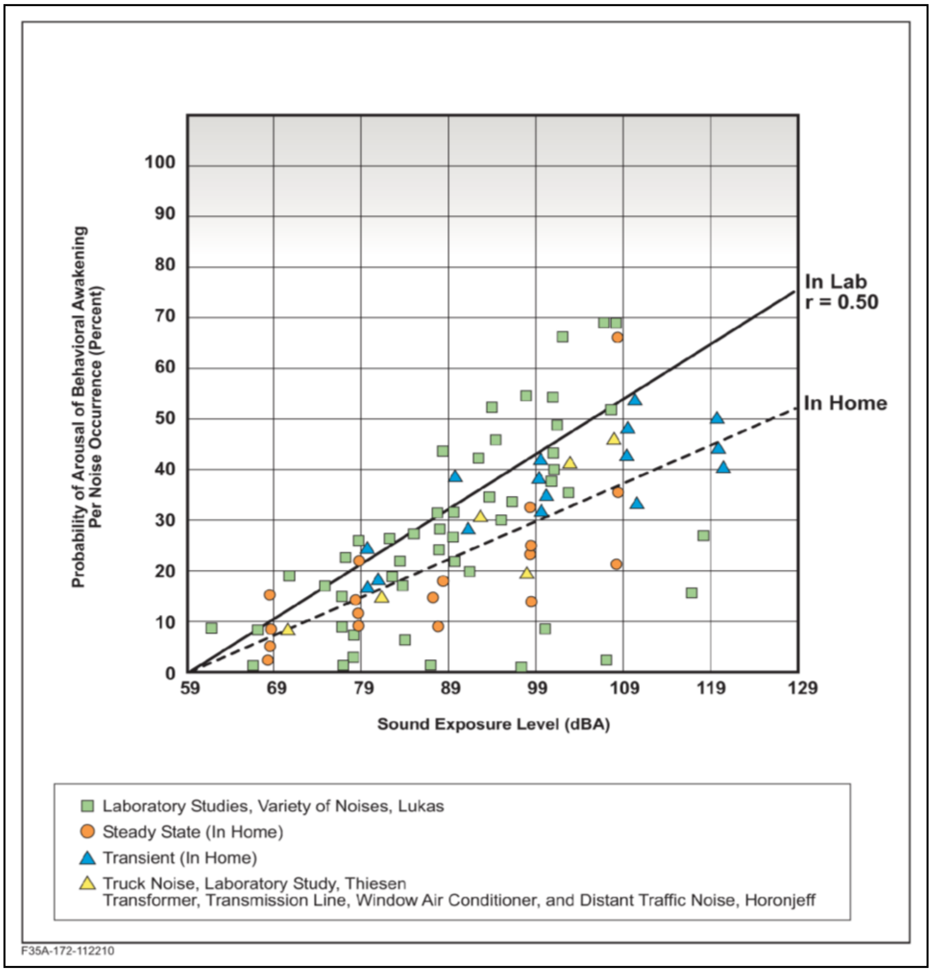


Figure C-4. Plot of Sleep Awakening Data Versus Indoor SEL

Based on the new information, the Federal Interagency Committee on Aircraft Noise (FICAN) updated its recommended dose-response curve in 1997, depicted as the lower curve on Figure C-5. This figure is based on the results of three field studies (Ollerhead et al. 1992; Fidell et al. 1994, 1995a, 1995b), along with the datasets from six previous field studies.

The new relationship represents the higher end, or upper envelope, of the latest field data. It should be interpreted as predicting the “maximum percent of the exposed population expected to be behaviorally awakened” or the “maximum percent awakened” for a given residential population. According to this relationship, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB, compared to 10 percent using the 1992 curve. An indoor SEL of 58 dB is equivalent to outdoor SELs of 73 and 83 dB, respectively, assuming 15 and 25 dB noise level reduction from outdoor to indoor with windows open and closed, respectively.

The FICAN 1997 curve is represented by the following equation:

$$\textbf{Percent Awakenings} = 0.0087 \times [\text{SEL} - 30]^{1.79}$$

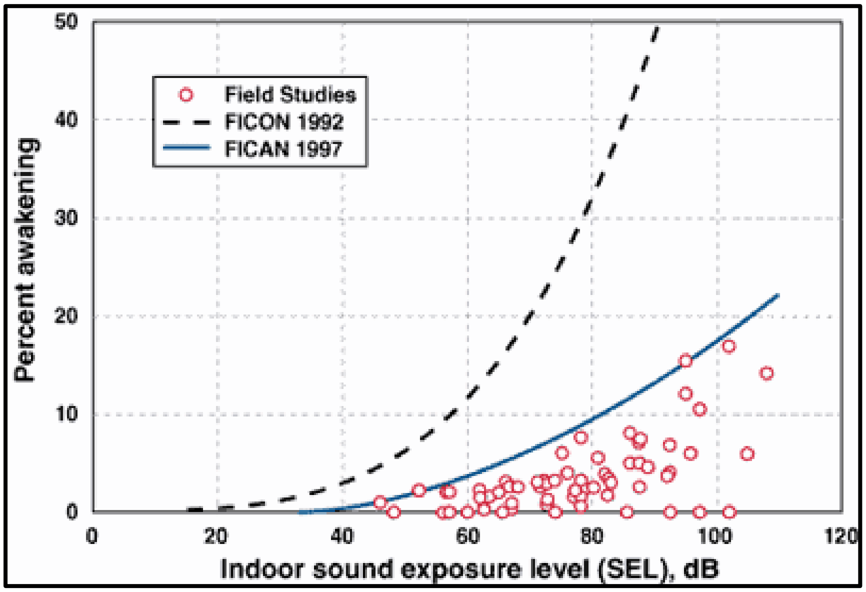


Figure C-5. FICAN's 1997 Recommended Sleep Disturbance Dose-Response Relationship

Note the relatively low percentage of awakenings to fairly high noise levels. People think they are awakened by a noise event, but usually the reason for awakening is otherwise. For example, a 1992 United Kingdom Civil Aviation Authority study found the average person was awakened about 18 times per night for reasons other than exposure to an aircraft noise – some of these awakenings are due to the biological rhythms of sleep and some to other reasons that were not correlated with specific aircraft events.

In July 2008, ANSI and the Acoustical Society of America (ASA) published a method to estimate the percent of the exposed population that might be awakened by multiple aircraft noise events based on statistical assumptions about the probability of awakening (or not awakening) (ANSI 2008). This method relies on probability theory rather than direct field research/experimental data to account for multiple events.

Figure C-6 depicts the awakenings data that form the basis and equations of ANSI (2008). The curve labeled 'Eq. (B1)' is the relationship between noise and awakening endorsed by FICAN in 1997. The ANSI-recommended curve labeled 'Eq. (1)' quantifies the probability of awakening for a population of sleepers who are exposed to an outdoor noise event as a function of the associated indoor SEL in the bedroom. This curve was derived from studies of behavioral awakenings associated with noise events in "steady state" situations where the population has been exposed to the noise long enough to be habituated. The data points on Figure C-6 come from these studies. Unlike the FICAN curve, the ANSI 2008 curve represents the average of the field research data points.

In December 2008, FICAN recommended the use of this new estimation procedure for future analyses of behavioral awakenings from aircraft noise. In that statement, FICAN also recognized that additional sleep disturbance research is underway by various research organizations, and results of that work may result in additional changes to FICAN's position. Until that time, FICAN recommends the use of ANSI (2008).

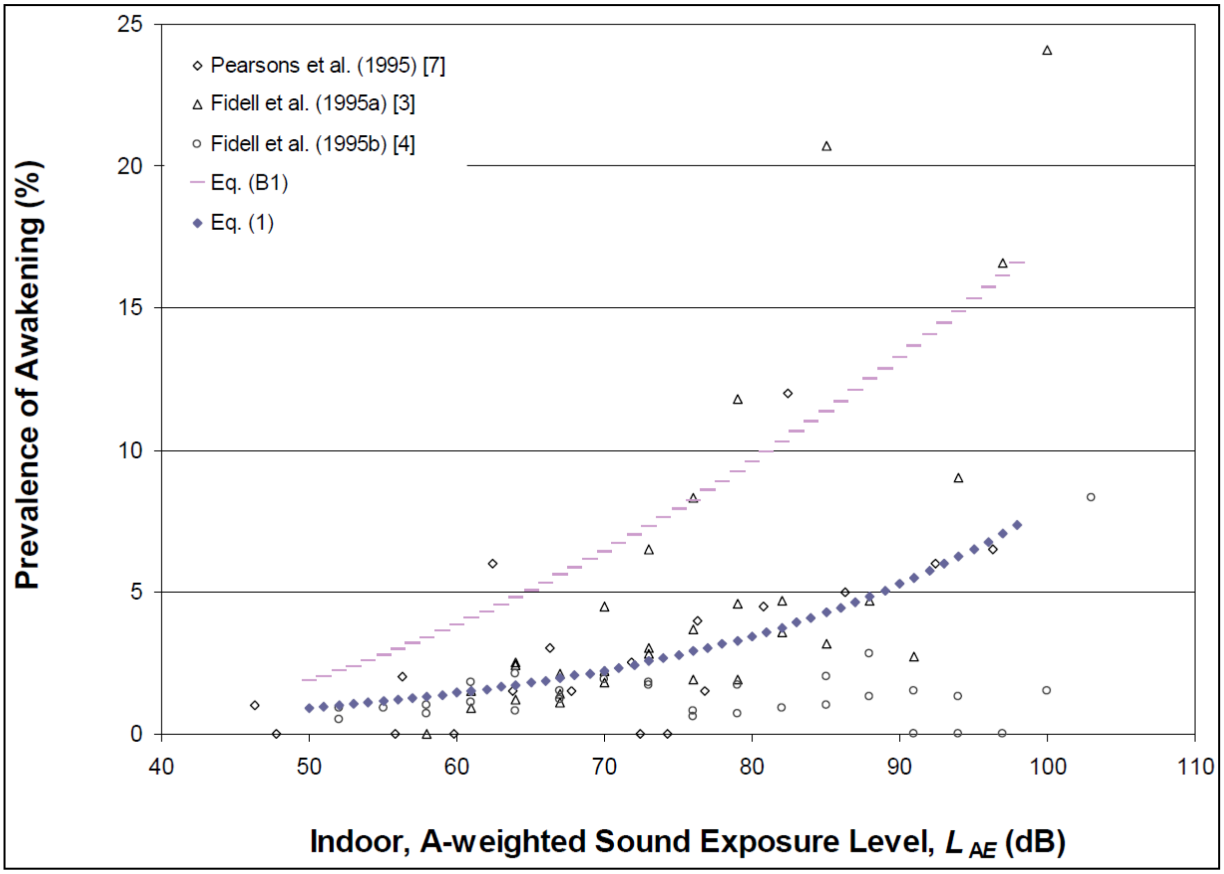


Figure C-6. Relation Between Indoor SEL and Percentage of Persons Awakened as Stated in ANSI/ASA S12.9-2008/Part 6 (ANSI 2008)

C.2.4 NOISE-INDUCED HEARING IMPAIRMENT

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound, i.e., a shift in the hearing threshold to a higher level. This change can either be a Temporary Threshold Shift (TTS) or a Permanent Threshold Shift (PTS) (Berger et al. 1995). TTS can result from exposure to loud noise over a given amount of time, yet the hearing loss is not necessarily permanent. An example of TTS might be a person attending a loud music concert. After the concert is over, the person may experience a threshold shift that may last several hours, depending upon the level and duration of exposure. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing ability eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover from the strain and fatigue of exposure. A common example of PTS is the result of working in a loud environment such as a factory. It is important to note that a temporary shift (TTS) can eventually become permanent (PTS) over time with continuous exposure to high noise levels. Thus, even if the ear is given time to recover from TTS, repeated

occurrence of TTS may eventually lead to permanent hearing loss. The point at which a TTS results in a PTS is difficult to identify and varies with a person's sensitivity.

Considerable data on hearing loss have been collected and analyzed by the scientific/medical community. It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1978). The Occupational Safety and Health Administration regulation of 1971 standardizes the limits on workplace noise exposure for protection from hearing loss as an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (the average level is based on a 5 dB decrease per doubling of exposure time) (DoL 1971). Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is an average sound level of 70 dB over a 24-hour period.

The USEPA established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5 dB PTS (USEPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics identified 75 dB as the minimum level at which hearing loss may occur (CHABA 1977). Finally, the World Health Organization has concluded that environmental and leisure-time noise below an $L_{eq}24$ value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 2000).

C.2.4.1 Hearing Loss and Aircraft Noise

The 1982 USEPA guidelines report specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (USEPA 1982). This effect is also described as Potential Hearing Loss. Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kHz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS. The Average NIPTS that can be expected for noise exposure as measured by the DNL metric is given in Table C-4.

Table C-4. Average NIPTS and 10th Percentile NIPTS as a Function of DNL

dB DNL	Average NIPTS dB[a]	10th Percentile NIPTS dB[a]
75–76	1.0	4.0
76–77	1.0	4.5
77–78	1.6	5.0
78–79	2.0	5.5
79–80	2.5	6.0
80–81	3.0	7.0
81–82	3.5	8.0
82–83	4.0	9.0
83–84	4.5	10.0
84–85	5.5	11.0
85–86	6.0	12.0
86–87	7.0	13.5
87–88	7.5	15.0
88–89	8.5	16.5
89–90	9.5	18.0

[a] Rounded to the nearest 0.5 dB.

For example, for a noise exposure of 80 dB DNL, the expected lifetime average value of NIPTS is 2.5 dB, or 6.0 dB for the 10th percentile. Characterizing the noise exposure in terms of DNL will usually overestimate the assessment of hearing loss risk as DNL includes a 10 dB weighting factor for aircraft operations occurring between 10:00 P.M. and 7:00 A.M. If, however, flight operations between the hours of 10:00 P.M. and 7:00 A.M. account for 5 percent or less of the total 24-hour operations, the overestimation is on the order of 1.5 dB.

From a civilian airport perspective, the scientific community has concluded that there is little likelihood that the resulting noise exposure from aircraft noise could result in either a temporary or permanent hearing loss. Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). The USEPA criterion (L_{eq}24 = 70 dBA) can be exceeded in some areas located near airports, but that is only the case outdoors. Inside a building, where people are more likely to spend most of their time, the average noise level will be much less than 70 dBA (Eldred and von Gierke 1993). Eldred and von Gierke also report that "several studies in the United States, Japan, and the United Kingdom have confirmed the predictions that the possibility for permanent hearing loss in communities, even under the most intense commercial take-off and landing patterns, is remote."

With regard to military airbases, as individual aircraft noise levels are increasing with the introduction of new aircraft, a 2009 DoD policy directive requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB (DoD 2009). Specifically, DoD components are directed to "use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss." This does not preclude populations outside the 80 dB DNL contour (i.e., at lower exposure levels) from being at some degree of risk of hearing loss. However, the analysis should be restricted to populations within this contour area, including residents of on-base housing. The exposure of workers inside the base boundary area should be considered occupational and evaluated using the appropriate DoD component regulations for occupational noise exposure.

With regard to military airspace activity, studies have shown conflicting results. A 1995 laboratory study measured changes in human hearing from noise representative of low-flying aircraft on Military Training Routes (Nixon et al. 1993). The potential effects of aircraft flying along Military Training Routes is of particular concern because maximum overflight noise levels can exceed 115 dB, with rapid increases in noise levels exceeding 30 dB per second. In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. Fifty percent of the subjects showed no change in hearing levels, 25 percent had a temporary 5 dB *increase* in sensitivity (the people could hear a 5 dB wider range of sound than before exposure), and 25 percent had a temporary 5 dB decrease in sensitivity (the people could hear a 5 dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The TTSs showed an increase in sensitivity of up to 10 dB.

In another study of 115 test subjects between 18 and 50 years old in 1999, TTSs were measured after laboratory exposure to military low-altitude flight noise (Ising et al. 1999). According to the authors, the results indicate that repeated exposure to military low-altitude flight noise with a maximum sound level (L_{max}) greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise-induced hearing loss in humans.

Aviation and typical community noise levels near airports are not comparable to the occupational or recreational noise exposures associated with hearing loss. Studies of aircraft noise levels associated with civilian airport activity have not definitively correlated permanent hearing impairment with aircraft activity. It is unlikely that airport neighbors will remain outside their homes 24 hours per day, so there is little likelihood of hearing loss below an average sound level of 75 dB DNL. Near military airbases, average noise levels above 75 dB may occur, and while new DoD policy dictates that NIPTS be evaluated, no research results to date have definitively related permanent hearing impairment to aviation noise.

C.2.4.2 Non-Auditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The non-auditory effect of noise on humans is not as easily substantiated as the effect on hearing. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, “It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body.” Psychological stresses may cause a physiological stress reaction that could result in impaired health. The National Institute for Occupational Safety and Health and USEPA commissioned the Committee on Hearing, Bioacoustics and Biomechanics (CHABA) in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA’s conclusion was that:

> Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been further studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older subjects and those not reporting impaired hearing ability (Rosenlund et al. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak et al. 1990). Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles et al. 1990).

Most studies of non-auditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential non-auditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic

manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day).

At the 1988 International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential non-auditory health effects in the work place (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the non-auditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two University of California, Los Angeles (UCLA) researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Centers for Disease Control and Prevention performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds et al. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-averaged sound levels below 75 dB. The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwarze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increases in admissions to mental hospitals, and adverse effects on pregnant women and fetuses (Harris 1997).

C.2.4.3 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task. While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

C.2.4.4 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (1997), requires Federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

C.2.4.4.1 Effects on Learning and Cognitive Abilities

In “Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools,” (ANSI 2002), ANSI refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children (ANSI 2002). ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to, surrounding land uses and the shielding of outdoor noise from the indoor environment. The ANSI acoustical performance criteria for schools include the requirement that the 1-hour average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic feet. This would require schools be constructed such that, in quiet neighborhoods, indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (ANSI 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (ANSI 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (ANSI 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in the last 20 years. Several studies suggest that aircraft noise can affect the academic performance of school children. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning. Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green et al. 1982). Researchers have found that tasks involving central processing and language comprehension (such as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993; Evans et al. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near LAX had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997; Cohen et al. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines et al. 2001a, 2001b). Similar studies involving the testing of attention, memory, and reading comprehension of school children located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans et al. 1998; Haines et al. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as 1-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines et al. 2001a, 2001b). In contrast, a 2002 study found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests were equal to that of the control group once the airport was closed (Hygge et al. 2002).

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the World Health Organization (WHO 2000) and a North Atlantic Treaty Organization working group (NATO 2000) to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites.

C.2.4.4.2 Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, blood pressure readings have been used to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans et al. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 millimeters for children

attending schools located in noisier environments compared to 86.77 millimeters for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 millimeters and 45.16 millimeters for the control group (Cohen et al. 1980).

Although the literature appears limited, studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines et al. 2001b, 2001c). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport, as compared to children at another school far away (Chen et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Andrus et al. 1975; Fisch 1977; Wu et al. 1995).

C.2.5 NOISE EFFECTS ON DOMESTIC ANIMALS AND WILDLIFE

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci et al. (1988) assert that the consequences that physiological effects may have on behavioral patterns are vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed outlines those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960s and 1970s on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and the introduction of supersonic jet aircraft. According to Manci et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts on wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and others that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or interfere with behavioral patterns (Manci et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate and attract other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary (TTS) and permanent (PTS) hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights. Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects. These include population decline and habitat loss. Most of the effects of noise are mild enough to be undetectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region. Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed-wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Manci et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the 1988 Manci et al. literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appear to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been previous exposures. Responses range from flight, trampling, stampeding, jumping, or running to movement of the head in the apparent direction of the noise source. Manci et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

C.2.5.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights, but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci et al. 1988). Some studies have reported primary and secondary effects, including reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased

heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies and claims by farmers linking adverse effects of aircraft noise on livestock did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle. In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the USAF prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies, but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (USAF 1994). A similar study reported that abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (USAF 1994). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (USAF 1994).

A majority of the studies reviewed suggest that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects on domestic animals have been limited. A number of studies (Kovalcik and Sottnik 1971; Parker and Bayley 1960) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

One study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a 1-year time period, and none were associated with aircraft disturbances (USAF 1993). In 1987, Anderson contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level (AGL) at 400 knots by running less than 10 meters. They resumed normal activity within 1 minute (USAF 1994). In 1983, Beyer found that helicopters caused more reaction than other low-altitude overflights. A 1964 study also found that helicopters flying 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers (USAF 1994).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or have their pregnancies disrupted after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights (USAF 1994). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (USAF 1994).

In a report to Congress, the U.S. Forest Service concluded that “evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (USFS 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate.” These varied study

results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses. Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (USAF 1993). In 1995, Bowles cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (USAF 1994). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc et al. studied the effects of F-14 jet aircraft noise on pregnant mares (1991). They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine. Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours or 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond et al. demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to aircraft noise (1963). Observations of heart rate increase were recorded and it was noted that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100 dB to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, and reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Gladwin et al. 1988; Manci et al. 1988).

Domestic Fowl. According to a 1994 position paper by the USAF on effects of low-altitude overflights (below 1,000 feet) on domestic fowl, overflight activity has negligible effects (USAF 1994). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds and birds not previously exposed are more likely to pile up in response to a noise stimulus (USAF 1994). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (USAF 1994). This suggests that the birds habituate relatively quickly. Egg

productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dB.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (USAF 1994). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55 percent for panic reactions, 31 percent for decreased production, 6 percent for reduced hatchability, 6 percent for weight loss, and less than 1 percent for reduced fertility (USAF 1994).

Turkeys. The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles et al. 1990). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (USAF 1994).

C.2.5.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (NPS 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock (Manci et al. 1988). This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci et al. 1988).

C.2.5.3 Mammals

Terrestrial Mammals. Studies of terrestrial mammals have shown that noise levels of 120 dBA can damage mammals’ ears, and levels of 95 dBA can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet AGL over important grizzly and polar bear habitat (Dufour 1980). Wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure and exposed to aircraft noise disturbance were a slight startle response, raising of the head, pricking ears, and scenting of the air. Panic reactions and

extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and for overflights higher than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kilogram animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters suggested that wolves were less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed.

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. These reactions occur naturally as a response to predation, so infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, are not additive. Aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals. The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci et al. 1988).

Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dBA caused a greater intensity of startle reactions than lower-intensity booms of 72 to 79 dBA. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980 in Manci et al. 1988).

Jehl and Cooper indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds (1980). According to the research, although the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater "disturbance level" exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats because aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley Air Force Bases from sorties predominantly involving jet aircraft. Survey results reported in Davis et al. indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace (2000). The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Park Service on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights (1994). Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. They also did not show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (USAF 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface.

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats (although their hearing is actually similar to that of pinnipeds) (Bullock et al. 1980). Little is known about the importance of acoustic communication to manatees, although they are known to produce at least 10 different types of sounds and are thought to have sensitive hearing (Richardson et al. 1995).

C.2.5.4 Birds

Auditory research conducted on birds indicates that they fall between reptiles and mammals relative to hearing sensitivity. According to Dooling, within the range of 1,000 to 5,000 Hz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals (1978). In contrast to mammals, bird sensitivity falls off at a greater rate with increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Grubb and King 1991; Ellis et al. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant to 85 dB for crested tern (Brown 1990; Ward and Stehn 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by “raucous discordant cries.” There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci et al. reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights (1988). However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (USFS 1992). Further study may be warranted.

A recent study, conducted cooperatively between DoD and the U.S. Fish and Wildlife Service, assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level, which ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

Lynch and Speake studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey in Alabama (1978). Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

C.2.5.4.1 Raptors

In a literature review of raptor responses to aircraft noise, Manci et al. found that most raptors did not show a negative response to overflights (1988). When negative responses were observed, they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 miles of a nest.

Ellis et al. performed a study to estimate the effects of low-level military jet aircraft and mid-to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle) (1991). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Re-occupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 meters or less produced few significant responses and no severe responses. Typical responses included

crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or re-occupancy. The locations of some of the nests may have caused some birds to be habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation.

Manci et al. noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises (1988). The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated that the greatest reaction to overflights (approximately 98 dBA) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle. A study by Grubb and King on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances (1991). The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 meters away caused reactions similar to other disturbance types. Ellis et al. showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 meters, rather than the noise level (1991). They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane. Fraser et al. have suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less (1985).

Osprey. A 1998 study by Trimper et al. in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until they grew to 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-Tailed Hawk. Andersen et al. conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests (1989). Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (9 of 17 birds flushed from their nests) than those

that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

C.2.5.4.2 Migratory Waterfowl

A study by Conomy et al. exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dBA (1998). It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaskan Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65 percent of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed-wing, single-engine aircraft (Ward et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of 3 days (1974). Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were under 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of pre-migratory staging areas.

Manci et al. reported that waterfowl were particularly disturbed by aircraft noise (1988). The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards et al. 1979).

C.2.5.4.3 Wading and Shore Birds

Black et al. studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron) (1984). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity—including nest success, nestling survival, and nestling chronology—was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology. Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75 percent of the 220 observations.

Ninety percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1979). Apparently non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to Military Training Routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (USAF 2000).

Burger studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach) (1986). Burger studied the effects of noise from John F. Kennedy International Airport in New York on herring gulls that nested less than 1 kilometer from the airport (1981). Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when a Concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (USAF 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of sooty terns on the Dry Tortugas (Austin et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, sooties were observed to react to sonic booms by rising in a “panic flight,” circling over the island, and then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of noddies on the same island hatched successfully in 1969, the year of the sooty hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles et al. 1991; Bowles et al. 1994; Cogger and Zegarra 1980) failed to show adverse effects on the hatching of eggs. A structural analysis (Ting et al. 2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger observed no effects of subsonic aircraft on herring gulls in the vicinity of John F. Kennedy International Airport (1981). The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

C.2.5.5 Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoots (genus *Scaphiopus*),

may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour in 1980 and Manci et al. in 1988, summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least TTSs or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American alligator and the spectacled caiman) reside in wetlands and canals along the base runway, suggesting that they can coexist with existing noise levels of an active runway, including DNLs of 85 dB.

C.2.5.6 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, one study suggests that wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” or “fright” response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

C.2.6 PROPERTY VALUES

There are a number of factors that affect property values, which makes predicting impacts difficult. Factors directly related to the property, such as size, improvements, and location of the property, as well as current conditions in the real estate market, interest rates, and housing sales

in the area, are more likely to have a direct adverse impact on property values. Several studies have analyzed property values as they relate to military and civilian aircraft noise. In one study, a regression analysis of property values as they relate to aircraft noise at two military installations was conducted (Fidell et al. 1996). This study found that, while aircraft noise at these installations may have had minor impacts on property values, it was difficult to quantify that impact. Other factors, such as the quality of the housing near the installations and the local real estate market, had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values of two comparable properties.

Another study analyzed 33 other studies attempting to quantify the impact of noise on property values (Nelson 2003). The result of the study supports the idea that the potential for an adverse impact on property values as a result of aircraft noise exists and estimates that the value of a specific property could be discounted between 0.5 and 0.6 percent per decibel when compared to a similar property that is not impacted by aircraft noise. Additional data indicate that the discount for property values as a result of noise would be higher for noise levels above 75 dB DNL.

C.2.7 SUBSONIC AIRCRAFT NOISE EFFECTS ON STRUCTURES

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than 1 second above a sound level of 130 dB are potentially damaging to structural components (CHABA 1977). A study directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or “rattle,” of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

C.2.8 SUBSONIC AIRCRAFT NOISE EFFECTS ON STRUCTURE AND TERRAIN

Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such effects, and it is considered improbable that such effects would result from routine, subsonic aircraft operations.

C.2.9 NOISE EFFECTS ON HISTORICAL AND ARCHAEOLOGICAL SITES

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Most scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on standing architecture. For example, the FAA published a study

of potential impacts resulting from vibrations caused by the noise of subsonic Concorde overflights on five historic properties, including a restored plantation house, a stone bridge and tollhouse, and other structures (Hershey, Kevala, and Burns 1975). This study analyzed the breakage probabilities of structural elements that might be considered susceptible to vibration, such as window glass, mortar, and plaster. The results indicated that, with the exception of some already cracked window glass, there was no practical risk of noise-induced vibration damage to any of these structures.

Some studies of the effects of overflights—both subsonic and supersonic—on archaeological structures and other types of sites also have been published. Battis examined the effects of low-altitude overflights of B-52, RF-4C, and A-7 aircraft on standing walls at Long House Ruin in northeastern Arizona (Battis 1988). The motion levels observed during all passes were well below a conservative threshold for vibration in ancient structures, a level of 1.3 millimeters per second, established by two previous studies. Battis concluded that vibration associated with aircraft overflights at speeds and altitudes similar to those measured in his study would have no significant damaging effect on Long House and similar sites.

USAF National Environment Policy Act documents have examined the potential impacts on historic properties that might result from subsonic and supersonic overflights. In 1995, USAF published the *Environmental Assessment for Continued Supersonic Operations in the Black Mountain Supersonic Corridor and the Alpha/Precision Impact Range Area*. Eligible and potentially eligible cultural resources in the area of potential effect include petroglyph and pictograph panels located on a variety of rock types, historic adobe and non-adobe structures with standing walls, and historic mines (which contain tunnels) and wells. The report concludes that supersonic low-altitude flights have occurred over these corridors for 25 years or more and have resulted in no significant impacts on cultural resources. The California State Historic Preservation Office agreed, and during National Historic Preservation Act (NHPA) Section 106 review of this undertaking, concurred with USAF's finding that continued supersonic overflights would have no effect on historic properties.

As noted above for the noise effects of noise-induced vibrations on normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

C.3 SUBSONIC AIRCRAFT NOISE MODELING

An aircraft in subsonic flight generally emits noise from two sources: the engines and flow noise around the airframe. Noise generation mechanisms are complex and, in practical models, the noise sources must be based on measured data. The USAF has developed a series of computer models and aircraft noise databases for this purpose. The models include NOISEMAP (Moulton 1992), which is used to model noise around airbases. This model uses the NOISEFILE database developed by USAF. NOISEFILE data include SEL and L_{max} as a function of speed and power setting for aircraft in straight flight.

Noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its trajectory. The models noted above divide the trajectory into segments whose noise can be computed from the data in NOISEFILE. The contributions from these segments are summed.

Supporting routines from NOISEMAP were used to calculate SEL and L_{max} for various flight altitudes and lateral off-sets from a ground receiver position. Sound intensity at a point on the

ground is also affected by several environmental factors, such as atmospheric conditions and properties of the terrain being overflown.

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ATTACHMENT C-1 REPRESENTATIVE LOCATIONS POINT ANALYSIS

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Attachment C-1. Representative Locations Point Analysis

As part of the noise analysis, a detailed acoustical analysis was performed for a series of locations, which are listed in Tables C-1-1 through C-1-4. As described in Appendix B, Section B.1, these points were established based on central points of U.S. Census subdivisions, and therefore, do not represent a specific noise-sensitive receptor.

Tables C-1-1 through C-1-4 present the details of the major noise contributors at each basing alternative under baseline and proposed scenarios. For example, under the Altus AFB baseline scenario, the contributor of the highest SEL to Location No. 1 is C-17 flying profile C17VPE, which is a closed pattern. At the point of maximum noise level, the aircraft is located at a slant distance of 254 feet, at a height of 1,460 feet above mean sea level (MSL), a power setting of 1.4 EPR, and a speed of 180 knots. The event would be expected to occur approximately 2.27 times per training day between the hours of 7:00 A.M. and 10:00 P.M., and the SEL for that event is approximately 106.9 dB.

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios

Altus Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
1	1	C-17	C17VPE	PAT	17RC44	1.14 EPR	180	1,460	254	2.27	0.24	106.9
1	2	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	2,180	987	7.86	0.77	100.9
1	3	C-17	C17A16	ARR	17LA32	1.14 EPR	160	1,810	669	0.18	0.01	99.6
1	4	C-17	C17VPK	PAT	17LC44	1.14 EPR	180	2,173	825	0.63	0.00	96.5
1	5	C-17	C17IPE	PAT	17LC14	1.14 EPR	160	1,784	851	1.56	0.09	96.4
1	6	C-17	C17A15	ARR	17LA32	1.14 EPR	180	1,832	937	0.18	0.01	96.3
1	7	C-17	C17A8	ARR	17AA33	1.15 EPR	160	1,805	821	4.28	0.27	96.0
1	8	C-17	C17DD	DEP	35RD11	1.34 EPR	160	2,804	1,734	0.89	0.00	95.9
1	9	C-17	C17VPL	PAT	17LC45	1.14 EPR	180	2,120	862	0.12	0.00	95.9
1	10	C-17	C17A15	ARR	17LA32	1.14 EPR	180	2,244	888	0.18	0.01	95.6
2	1	C-17	C17A46	ARR	35RA32	1.10 EPR	200	2,000	736	0.10	0.00	97.1
2	2	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,651	2,395	14.61	1.42	92.3
2	3	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,651	2,395	12.62	0.59	92.3
2	4	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,651	2,395	3.91	0.26	92.3
2	5	KC-46X	46RCX	PAT	35RC13	60.00 % N1	180	1,702	476	1.21	0.14	91.4
2	6	C-17	C17VPP	PAT	35RC13	1.20 EPR	160	2,900	1,604	6.79	0.32	90.7
2	7	C-17	C17VPO	PAT	35LC17	1.20 EPR	160	2,900	1,603	1.23	0.06	90.6
2	8	KC-135R	135RDC	DEP	17LD32	92.00 % NF	185	2,841	1,904	0.19	0.03	88.8
2	9	C-17	C17TDB	DEP	17LD32	1.34 EPR	250	4,506	3,394	1.03	0.00	88.5
2	10	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	4,949	3,798	0.46	0.00	88.2
3	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	250	2,915	1,499	0.24	0.00	101.5
3	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	250	2,915	1,499	0.24	0.00	101.5
3	3	C-17	C17A18	ARR	17RA21	1.15 EPR	125	2,066	685	0.08	0.06	99.4
3	4	C-17	C17A19	ARR	17RA22	1.14 EPR	125	2,096	712	0.08	0.06	98.9
3	5	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	2,135	749	0.78	0.05	98.5
3	6	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	2,135	749	0.78	0.05	98.5
3	7	C-17	TC17A1	ARR	17RA11	1.14 EPR	140	2,119	733	0.09	0.03	98.3
3	8	C-17	C17AB	ARR	17RA11	1.14 EPR	140	2,119	733	1.25	0.00	98.3
3	9	C-17	C17VPI	PAT	17LC17	1.10 EPR	160	2,018	710	3.91	0.26	98.2
3	10	C-17	C17VPA	PAT	17RC13	1.10 EPR	160	2,020	711	0.44	0.03	98.2
4	1	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,034	945	14.61	1.42	102.1
4	2	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,034	945	12.62	0.59	102.1
4	3	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,034	945	3.91	0.26	102.1
4	4	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	2,537	1,658	1.03	0.00	97.4
4	5	C-17	C17TDA	DEP	17LD31	1.42 EPR	250	2,262	1,654	1.03	0.00	96.6
4	6	C-17	C17DA	DEP	17LD11	1.34 EPR	160	2,457	1,751	1.64	0.00	96.2
4	7	C-17	C17VPK	PAT	17LC44	1.34 EPR	170	2,726	1,781	0.63	0.00	96.1
4	8	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	2,726	1,781	0.46	0.00	96.1
4	9	C-17	C17VPL	PAT	17LC45	1.34 EPR	170	2,726	1,781	0.12	0.00	96.1
4	10	C-17	C17A42	ARR	35RA33	1.15 EPR	160	991	971	1.46	0.05	95.9
5	1	C-17	C17VPO	PAT	35LC17	1.34 EPR	170	2,255	996	1.23	0.06	101.2
5	2	C-17	C17VPM	PAT	35LC13	1.34 EPR	170	2,360	1,088	0.23	0.02	100.5
5	3	C-17	C17VPN	PAT	35LC16	1.34 EPR	170	2,360	1,088	0.87	0.09	100.5

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
5	4	C-17	C17TDH	DEP	35RD32	1.34 EPR	160	2,382	1,632	0.55	0.00	98.3
5	5	C-17	C17VPP	PAT	35RC13	1.34 EPR	170	1,943	1,517	6.79	0.32	98.0
5	6	C-17	C17TDG	DEP	35RD31	1.42 EPR	250	1,882	1,656	0.55	0.00	96.6
5	7	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	1,884	1,655	7.86	0.77	96.5
5	8	C-17	C17VPX	PAT	35RC42	1.34 EPR	170	2,530	1,742	0.25	0.00	96.5
5	9	C-17	C17VPW	PAT	35RC44	1.34 EPR	170	2,530	1,742	0.34	0.00	96.5
5	10	C-17	C17VPT	PAT	35RC45	1.34 EPR	170	2,530	1,742	0.07	0.00	96.5
6	1	C-17	C17A46	ARR	35RA32	1.10 EPR	200	2,000	727	0.10	0.00	96.7
6	2	C-17	C17IPE	PAT	17LC14	1.20 EPR	160	1,982	1,454	1.56	0.09	92.8
6	3	C-17	C17VPH	PAT	17LC16	1.10 EPR	160	2,899	1,594	14.61	1.42	91.8
6	4	C-17	C17VPG	PAT	17LC13	1.10 EPR	160	2,899	1,594	12.62	0.59	91.8
6	5	C-17	C17VPI	PAT	17LC17	1.10 EPR	160	2,899	1,594	3.91	0.26	91.7
6	6	C-17	C17VPO	PAT	35LC17	1.20 EPR	160	2,900	1,594	1.23	0.06	91.0
6	7	C-17	C17VPP	PAT	35RC13	1.20 EPR	160	2,900	1,594	6.79	0.32	91.0
6	8	C-17	C17VPU	PAT	35RC16	1.20 EPR	160	2,898	1,592	7.86	0.77	90.8
6	9	C-17	C17VPN	PAT	35LC16	1.20 EPR	160	2,899	1,593	0.87	0.09	90.8
6	10	C-17	C17A32	ARR	35AA32	1.10 EPR	200	2,000	1,649	0.15	0.01	87.9
7	1	C-17	C17TDH	DEP	35RD32	1.40 EPR	0	1,382	1,609	0.55	0.00	101.4
7	2	C-17	C17TDG	DEP	35RD31	1.40 EPR	0	1,382	1,609	0.55	0.00	101.3
7	3	C-17	C17TDB	DEP	17LD32	1.42 EPR	145	1,751	1,660	1.03	0.00	98.7
7	4	C-17	C17TDA	DEP	17LD31	1.42 EPR	145	1,530	1,620	1.03	0.00	97.9
7	5	KC-135R	135RDL	DEP	35RD32	88.00 % NF	0	1,382	1,609	0.13	0.02	97.5
7	6	KC-135R	135RDK	DEP	35RD12	88.00 % NF	0	1,382	1,609	0.00	0.00	97.5
7	7	KC-135R	135RDJ	DEP	35RD11	88.00 % NF	0	1,382	1,609	0.01	0.00	97.5
7	8	C-17	C17DA	DEP	17LD11	1.34 EPR	130	1,751	1,660	1.64	0.00	97.1
7	9	C-17	C17VPK	PAT	17LC44	1.34 EPR	140	1,636	1,635	0.63	0.00	96.8
7	10	C-17	C17VPJ	PAT	17LC42	1.34 EPR	140	1,636	1,635	0.46	0.00	96.8
8	1	C-17	C17IPF	PAT	35RC14	1.14 EPR	160	1,899	1,063	0.84	0.05	94.0
8	2	C-17	C17VPQ	PAT	35LC42	1.14 EPR	180	2,295	1,174	0.88	0.09	93.1
8	3	KC-135R	135RDC	DEP	17LD32	92.00 % NF	185	2,572	1,361	0.19	0.03	92.6
8	4	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	3,892	2,656	1.03	0.00	91.0
8	5	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	4,254	2,996	0.46	0.00	90.3
8	6	C-17	C17VPK	PAT	17LC44	1.34 EPR	170	4,254	2,996	0.63	0.00	90.3
8	7	C-17	C17VPL	PAT	17LC45	1.34 EPR	170	4,254	2,996	0.12	0.00	90.3
8	8	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,479	2,989	14.61	1.42	90.2
8	9	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,479	2,989	12.62	0.59	90.2
8	10	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,479	2,989	3.91	0.26	90.2
9	1	T-38C	T38C2	PAT	17RC12	100.00 % RPM	250	2,513	1,182	0.45	0.00	104.1
9	2	T-38C	T38C1	PAT	17RC11	100.00 % RPM	250	2,513	1,182	0.45	0.00	104.1
9	3	C-17	C17A40	ARR	35LA32	1.14 EPR	160	1,722	406	0.30	0.21	104.0
9	4	C-17	C17A36	ARR	35LA34	1.14 EPR	160	1,721	406	0.30	0.21	103.9

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
9	5	C-17	C17A39	ARR	35LA23	1.15 EPR	125	1,769	451	0.04	0.03	103.1
9	6	C-17	C17A38	ARR	35LA22	1.15 EPR	125	1,769	451	0.04	0.03	103.1
9	7	C-17	C17A37	ARR	35LA21	1.15 EPR	125	1,769	451	0.04	0.03	103.1
9	8	C-17	C17IPC	PAT	35LC11	1.14 EPR	140	1,786	467	0.42	0.03	102.9
9	9	C-17	C17IPD	PAT	35LC12	1.14 EPR	140	1,786	467	0.42	0.03	102.9
9	10	C-17	C17VPV	PAT	35RC17	1.10 EPR	140	1,744	423	2.11	0.14	102.9
10	1	T-38C	T38C1	PAT	17RC11	100.00 % RPM	250	2,686	1,627	0.45	0.00	100.5
10	2	T-38C	T38C2	PAT	17RC12	100.00 % RPM	250	2,686	1,627	0.45	0.00	100.5
10	3	C-17	C17VPV	PAT	35RC17	1.10 EPR	140	1,875	798	2.11	0.14	97.0
10	4	C-17	TC17D2	DEP	17RD12	1.34 EPR	160	2,863	1,777	0.06	0.00	95.7
10	5	C-17	TC17D1	DEP	17RD11	1.34 EPR	160	2,863	1,777	0.06	0.00	95.7
10	6	C-17	C17DB	DEP	17RD11	1.34 EPR	160	2,863	1,777	3.44	0.28	95.7
10	7	C-17	C17A40	ARR	35LA32	1.14 EPR	160	1,848	1,053	0.30	0.21	95.2
10	8	T-38C	T38D1	DEP	17RD11	100.00 % RPM	250	3,702	2,544	0.36	0.00	95.0
10	9	T-38C	T38D2	DEP	17RD12	100.00 % RPM	250	3,702	2,544	0.36	0.00	95.0
10	10	C-17	C17A36	ARR	35LA34	1.14 EPR	160	1,846	1,052	0.30	0.21	94.8
11	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	250	2,561	1,201	0.24	0.00	103.9
11	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	250	2,561	1,201	0.24	0.00	103.9
11	3	C-17	C17A24	ARR	17RA32	1.14 EPR	160	1,785	497	0.55	0.39	102.2
11	4	C-17	C17A35	ARR	17RA34	1.14 EPR	160	1,785	497	0.55	0.39	102.0
11	5	C-17	C17A18	ARR	17RA21	1.15 EPR	125	1,804	512	0.08	0.06	101.8
11	6	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	1,845	544	0.78	0.05	101.5
11	7	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	1,845	544	0.78	0.05	101.5
11	8	C-17	C17VPI	PAT	17LC17	1.10 EPR	140	1,777	490	3.91	0.26	101.4
11	9	C-17	C17A19	ARR	17RA22	1.14 EPR	125	1,822	526	0.08	0.06	101.4
11	10	C-17	C17VPA	PAT	17RC13	1.10 EPR	140	1,777	491	0.44	0.03	101.4
12	1	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	2,445	1,533	7.86	0.77	97.6
12	2	C-17	C17VPF	PAT	17RC42	1.14 EPR	180	2,113	992	1.64	0.16	94.4
12	3	C-17	C17VPP	PAT	35RC13	1.34 EPR	170	2,397	2,095	6.79	0.32	94.1
12	4	C-17	C17IPE	PAT	17LC14	1.14 EPR	160	1,867	1,247	1.56	0.09	93.2
12	5	C-17	C17VPE	PAT	17RC44	1.14 EPR	180	2,603	1,247	2.27	0.24	92.0
12	6	C-17	C17VPJ	PAT	17LC42	1.14 EPR	180	2,390	1,299	0.46	0.00	91.9
12	7	C-17	C17TDH	DEP	35RD32	1.34 EPR	160	3,420	2,438	0.55	0.00	91.9
12	8	C-17	C17A17	ARR	17LA33	1.15 EPR	160	2,518	1,323	2.71	0.09	91.8
12	9	C-17	C17VPX	PAT	35RC42	1.34 EPR	170	3,679	2,655	0.25	0.00	91.1
12	10	C-17	C17VPW	PAT	35RC44	1.34 EPR	170	3,679	2,655	0.34	0.00	91.1
13	1	T-38C	T38D4	DEP	35LD12	100.00 % RPM	250	2,243	3,699	0.19	0.00	92.7
13	2	T-38C	T38D3	DEP	35LD11	100.00 % RPM	250	2,243	3,699	0.19	0.00	92.6
13	3	T-38C	T38C4	PAT	35LC11	100.00 % RPM	165	1,897	3,632	0.24	0.00	91.5

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
13	4	T-38C	T38C3	PAT	35LC12	100.00 % RPM	165	1,897	3,632	0.24	0.00	91.5
13	5	T-38C	T38D1	DEP	17RD11	100.00 % RPM	0	1,382	3,595	0.36	0.00	91.4
13	6	T-38C	T38D2	DEP	17RD12	100.00 % RPM	0	1,382	3,595	0.36	0.00	91.4
13	7	C-17	C17TDF	DEP	35LD32	1.42 EPR	145	2,002	3,648	1.17	0.00	91.1
13	8	C-17	C17TDE	DEP	35LD31	1.42 EPR	185	1,662	3,606	1.17	0.00	89.8
13	9	C-17	C17VPS	PAT	35LC45	1.34 EPR	140	1,854	3,626	0.23	0.02	89.6
13	10	C-17	C17VPR	PAT	35LC44	1.34 EPR	140	1,854	3,626	1.22	0.13	89.6
14	1	C-17	C17VPA	PAT	17RC13	1.34 EPR	170	2,729	1,415	0.44	0.03	98.1
14	2	C-17	C17VPB	PAT	17RC16	1.34 EPR	170	2,752	1,770	1.62	0.16	96.2
14	3	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,420	2,789	14.61	1.42	92.5
14	4	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,420	2,789	12.62	0.59	92.5
14	5	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,420	2,789	3.91	0.26	92.5
14	6	C-17	C17VPC	PAT	17RC17	1.34 EPR	170	2,748	2,651	2.29	0.11	92.5
14	7	C-17	C17VPM	PAT	35LC13	1.20 EPR	160	2,900	1,758	0.23	0.02	90.0
14	8	C-17	C17A40	ARR	35LA32	1.10 EPR	180	2,900	1,758	0.30	0.21	86.5
14	9	C-17	C17TDD	DEP	17RD32	1.34 EPR	250	4,756	4,654	2.17	0.00	86.2
14	10	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	3,398	6,162	1.03	0.00	86.0
15	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	165	2,289	971	0.24	0.00	106.3
15	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	165	2,289	971	0.24	0.00	106.3
15	3	C-17	C17VPO	PAT	35LC17	1.34 EPR	170	1,928	594	1.23	0.06	105.9
15	4	C-17	C17VPM	PAT	35LC13	1.34 EPR	170	1,973	636	0.23	0.02	105.2
15	5	C-17	C17VPN	PAT	35LC16	1.34 EPR	170	1,973	636	0.87	0.09	105.2
15	6	C-17	C17A24	ARR	17RA32	1.14 EPR	140	1,580	407	0.55	0.39	103.7
15	7	C-17	C17A35	ARR	17RA34	1.14 EPR	140	1,580	407	0.55	0.39	103.6
15	8	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	1,627	431	0.78	0.05	103.5
15	9	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	1,627	431	0.78	0.05	103.5
15	10	C-17	C17A18	ARR	17RA21	1.15 EPR	125	1,608	421	0.08	0.06	103.4
16	1	C-17	C17CPWA	PAT	17RCW	1.34 EPR	170	2,167	2,230	8.41	0.39	94.9
16	2	T-38C	T38C1	PAT	17RC11	100.00 % RPM	165	2,330	3,767	0.45	0.00	90.5
16	3	T-38C	T38C2	PAT	17RC12	100.00 % RPM	165	2,330	3,767	0.45	0.00	90.5
16	4	T-38C	T38D1	DEP	17RD11	100.00 % RPM	250	3,054	4,020	0.36	0.00	89.6
16	5	T-38C	T38D2	DEP	17RD12	100.00 % RPM	250	3,054	4,020	0.36	0.00	89.6
16	6	T-38C	T38D3	DEP	35LD11	100.00 % RPM	0	1,382	5,518	0.19	0.00	89.1
16	7	T-38C	T38D4	DEP	35LD12	100.00 % RPM	0	1,382	5,518	0.19	0.00	89.1
16	8	C-17	C17TDC	DEP	17RD31	1.42 EPR	250	2,270	3,761	2.17	0.00	88.8
16	9	C-17	C17TDD	DEP	17RD32	1.34 EPR	160	2,442	3,907	2.17	0.00	88.8
16	10	C-17	TC17D2	DEP	17RD12	1.34 EPR	160	2,459	3,803	0.06	0.00	88.7

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus FTU												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
1	1	C-17	C17VPE	PAT	17RC44	1.14 EPR	180	1,460	254	2.27	0.24	106.9
1	2	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	2,180	987	7.86	0.77	100.9
1	3	C-17	C17A16	ARR	17LA32	1.14 EPR	160	1,810	669	0.18	0.01	99.6
1	4	C-17	C17VPK	PAT	17LC44	1.14 EPR	180	2,173	825	0.63	0.00	96.5
1	5	C-17	C17IPE	PAT	17LC14	1.14 EPR	160	1,784	851	1.56	0.09	96.4
1	6	C-17	C17A7	ARR	17AA32	1.14 EPR	160	1,832	937	0.29	0.02	96.3
1	7	C-17	C17A8	ARR	17AA33	1.15 EPR	160	1,805	821	4.28	0.27	96.0
1	8	C-17	C17DD	DEP	35RD11	1.34 EPR	160	2,804	1,734	0.89	0.00	95.9
1	9	C-17	C17VPL	PAT	17LC45	1.14 EPR	180	2,120	862	0.12	0.00	95.9
1	10	C-17	C17A15	ARR	17LA32	1.14 EPR	180	2,244	888	0.18	0.01	95.6
2	1	C-17	C17A46	ARR	35RA32	1.10 EPR	200	2,000	736	0.10	0.00	97.1
2	2	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,651	2,395	14.61	1.42	92.3
2	3	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,651	2,395	12.62	0.59	92.3
2	4	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,651	2,395	3.91	0.26	92.3
2	5	KC-46X	46RCX	PAT	35RC13	60.00 % N1	180	1,702	476	3.83	0.88	91.4
2	6	C-17	C17VPP	PAT	35RC13	1.20 EPR	160	2,900	1,605	6.79	0.32	90.7
2	7	C-17	C17VPO	PAT	35LC17	1.20 EPR	160	2,900	1,604	1.23	0.06	90.6
2	8	KC-135R	135RDC	DEP	17LD32	92.00 % NF	185	2,841	1,904	0.19	0.03	89.9
2	9	C-17	C17TDB	DEP	17LD32	1.34 EPR	250	4,506	3,394	1.03	0.00	88.5
2	10	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	4,949	3,798	0.46	0.00	88.2
3	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	250	2,915	1,499	0.24	0.00	101.5
3	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	250	2,915	1,499	0.24	0.00	101.5
3	3	C-17	C17A18	ARR	17RA21	1.15 EPR	125	2,066	686	0.08	0.06	99.4
3	4	C-17	C17A19	ARR	17RA22	1.14 EPR	125	2,096	712	0.08	0.06	98.9
3	5	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	2,135	749	0.78	0.05	98.5
3	6	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	2,135	749	0.78	0.05	98.5
3	7	C-17	TC17A1	ARR	17RA11	1.14 EPR	140	2,119	733	0.09	0.03	98.3
3	8	C-17	C17AB	ARR	17RA11	1.14 EPR	140	2,119	733	1.25	0.00	98.3
3	9	C-17	C17VPI	PAT	17LC17	1.10 EPR	160	2,018	710	3.91	0.26	98.2
3	10	C-17	C17VPA	PAT	17RC13	1.10 EPR	160	2,020	711	0.44	0.03	98.2
4	1	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,034	945	14.61	1.42	102.1
4	2	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,034	945	12.62	0.59	102.1
4	3	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,034	945	3.91	0.26	102.1
4	4	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	2,537	1,658	1.03	0.00	97.4
4	5	C-17	C17TDA	DEP	17LD31	1.42 EPR	250	2,262	1,654	1.03	0.00	96.6
4	6	C-17	C17DA	DEP	17LD11	1.34 EPR	160	2,457	1,751	1.64	0.00	96.2
4	7	C-17	C17VPK	PAT	17LC44	1.34 EPR	170	2,726	1,781	0.63	0.00	96.1
4	8	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	2,726	1,781	0.46	0.00	96.1
4	9	C-17	C17VPL	PAT	17LC45	1.34 EPR	170	2,726	1,781	0.12	0.00	96.1
4	10	C-17	C17A42	ARR	35RA33	1.15 EPR	160	991	971	1.46	0.05	95.9
5	1	C-17	C17VPO	PAT	35LC17	1.34 EPR	170	2,255	996	1.23	0.06	101.2
5	2	C-17	C17VPM	PAT	35LC13	1.34 EPR	170	2,360	1,088	0.23	0.02	100.5
5	3	C-17	C17VPN	PAT	35LC16	1.34 EPR	170	2,360	1,088	0.87	0.09	100.5

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus FTU												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
5	4	C-17	C17TDH	DEP	35RD32	1.34 EPR	160	2,382	1,632	0.55	0.00	98.3
5	5	C-17	C17VPP	PAT	35RC13	1.34 EPR	170	1,943	1,517	6.79	0.32	98.0
5	6	KC-46X	46C9	PAT	35RC4	85.00 % N1	180	2,000	684	0.19	0.03	97.1
5	7	C-17	C17TDG	DEP	35RD31	1.42 EPR	250	1,882	1,656	0.55	0.00	96.6
5	8	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	1,884	1,655	7.86	0.77	96.5
5	9	C-17	C17VPX	PAT	35RC42	1.34 EPR	170	2,530	1,742	0.25	0.00	96.5
5	10	C-17	C17VPW	PAT	35RC44	1.34 EPR	170	2,530	1,742	0.34	0.00	96.5
6	1	C-17	C17A46	ARR	35RA32	1.10 EPR	200	2,000	727	0.10	0.00	96.7
6	2	KC-46X	46C4	PAT	17LC4	85.00 % N1	180	2,446	876	0.45	0.07	94.3
6	3	C-17	C17IPE	PAT	17LC14	1.20 EPR	160	1,982	1,454	1.56	0.09	92.8
6	4	C-17	C17VPH	PAT	17LC16	1.10 EPR	160	2,899	1,594	14.61	1.42	91.8
6	5	C-17	C17VPG	PAT	17LC13	1.10 EPR	160	2,899	1,594	12.62	0.59	91.8
6	6	C-17	C17VPI	PAT	17LC17	1.10 EPR	160	2,899	1,594	3.91	0.26	91.8
6	7	C-17	C17VPO	PAT	35LC17	1.20 EPR	160	2,900	1,594	1.23	0.06	91.0
6	8	C-17	C17VPP	PAT	35RC13	1.20 EPR	160	2,900	1,594	6.79	0.32	91.0
6	9	C-17	C17VPU	PAT	35RC16	1.20 EPR	160	2,898	1,592	7.86	0.77	90.8
6	10	C-17	C17VPN	PAT	35LC16	1.20 EPR	160	2,899	1,593	0.87	0.09	90.8
7	1	C-17	C17TDH	DEP	35RD32	1.40 EPR	0	1,382	1,609	0.55	0.00	101.4
7	2	C-17	C17TDG	DEP	35RD31	1.40 EPR	0	1,382	1,609	0.55	0.00	101.3
7	3	C-17	C17TDB	DEP	17LD32	1.42 EPR	145	1,751	1,660	1.03	0.00	98.7
7	4	C-17	C17TDA	DEP	17LD31	1.42 EPR	145	1,530	1,619	1.03	0.00	97.9
7	5	KC-135R	135RDL	DEP	35RD32	88.00 % NF	0	1,382	1,609	0.13	0.02	97.5
7	6	KC-135R	135RDK	DEP	35RD12	88.00 % NF	0	1,382	1,609	0.00	0.00	97.5
7	7	KC-135R	135RDJ	DEP	35RD11	88.00 % NF	0	1,382	1,609	0.01	0.00	97.5
7	8	C-17	C17DA	DEP	17LD11	1.34 EPR	130	1,751	1,660	1.64	0.00	97.1
7	9	C-17	C17VPK	PAT	17LC44	1.34 EPR	140	1,636	1,635	0.63	0.00	96.8
7	10	C-17	C17VPJ	PAT	17LC42	1.34 EPR	140	1,636	1,635	0.46	0.00	96.8
8	1	C-17	C17IPF	PAT	35RC14	1.14 EPR	160	1,899	1,062	0.84	0.05	94.0
8	2	C-17	C17VPQ	PAT	35LC42	1.14 EPR	180	2,295	1,174	0.88	0.09	93.1
8	3	KC-135R	135RDC	DEP	17LD32	92.00 % NF	185	2,572	1,361	0.19	0.03	92.6
8	4	KC-46X	46RDC	DEP	17LD32	92.00 % N1	185	2,559	1,350	0.12	0.07	91.3
8	5	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	3,892	2,656	1.03	0.00	91.0
8	6	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	4,254	2,996	0.46	0.00	90.3
8	7	C-17	C17VPK	PAT	17LC44	1.34 EPR	170	4,254	2,996	0.63	0.00	90.3
8	8	C-17	C17VPL	PAT	17LC45	1.34 EPR	170	4,254	2,996	0.12	0.00	90.3
8	9	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,479	2,989	14.61	1.42	90.2
8	10	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,479	2,989	12.62	0.59	90.2
9	1	T-38C	T38C2	PAT	17RC12	100.00 % RPM	250	2,513	1,183	0.45	0.00	104.1
9	2	T-38C	T38C1	PAT	17RC11	100.00 % RPM	250	2,513	1,183	0.45	0.00	104.1

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus FTU												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
9	3	C-17	C17A40	ARR	35LA32	1.14 EPR	160	1,722	407	0.30	0.21	104.0
9	4	C-17	C17A36	ARR	35LA34	1.14 EPR	160	1,721	406	0.30	0.21	103.9
9	5	C-17	C17A39	ARR	35LA23	1.15 EPR	125	1,769	451	0.04	0.03	103.0
9	6	C-17	C17A38	ARR	35LA22	1.15 EPR	125	1,769	451	0.04	0.03	103.0
9	7	C-17	C17A37	ARR	35LA21	1.15 EPR	125	1,769	451	0.04	0.03	103.0
9	8	C-17	C17IPC	PAT	35LC11	1.14 EPR	140	1,786	467	0.42	0.03	102.9
9	9	C-17	C17IPD	PAT	35LC12	1.14 EPR	140	1,786	467	0.42	0.03	102.9
9	10	C-17	C17VPV	PAT	35RC17	1.10 EPR	140	1,744	423	2.11	0.14	102.8
10	1	T-38C	T38C1	PAT	17RC11	100.00 % RPM	250	2,686	1,628	0.45	0.00	100.5
10	2	T-38C	T38C2	PAT	17RC12	100.00 % RPM	250	2,686	1,628	0.45	0.00	100.5
10	3	C-17	C17VPV	PAT	35RC17	1.10 EPR	140	1,875	798	2.11	0.14	97.0
10	4	C-17	TC17D2	DEP	17RD12	1.34 EPR	160	2,863	1,777	0.06	0.00	95.7
10	5	C-17	TC17D1	DEP	17RD11	1.34 EPR	160	2,863	1,777	0.06	0.00	95.7
10	6	C-17	C17DB	DEP	17RD11	1.34 EPR	160	2,863	1,777	3.44	0.28	95.7
10	7	C-17	C17A40	ARR	35LA32	1.14 EPR	160	1,848	1,054	0.30	0.21	95.2
10	8	T-38C	T38D1	DEP	17RD11	100.00 % RPM	250	3,702	2,544	0.36	0.00	95.0
10	9	T-38C	T38D2	DEP	17RD12	100.00 % RPM	250	3,702	2,544	0.36	0.00	95.0
10	10	C-17	C17A36	ARR	35LA34	1.14 EPR	160	1,846	1,052	0.30	0.21	94.8
11	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	250	2,561	1,201	0.24	0.00	103.9
11	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	250	2,561	1,201	0.24	0.00	103.9
11	3	C-17	C17A24	ARR	17RA32	1.14 EPR	160	1,785	497	0.55	0.39	102.2
11	4	C-17	C17A35	ARR	17RA34	1.14 EPR	160	1,785	497	0.55	0.39	102.1
11	5	C-17	C17A18	ARR	17RA21	1.15 EPR	125	1,804	512	0.08	0.06	101.8
11	6	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	1,845	544	0.78	0.05	101.5
11	7	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	1,845	544	0.78	0.05	101.5
11	8	C-17	C17VPI	PAT	17LC17	1.10 EPR	140	1,777	489	3.91	0.26	101.4
11	9	C-17	C17A19	ARR	17RA22	1.14 EPR	125	1,822	526	0.08	0.06	101.4
11	10	C-17	C17VPA	PAT	17RC13	1.10 EPR	140	1,777	491	0.44	0.03	101.4
12	1	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	2,445	1,533	7.86	0.77	97.6
12	2	C-17	C17VPF	PAT	17RC42	1.14 EPR	180	2,113	993	1.64	0.16	94.4
12	3	C-17	C17VPP	PAT	35RC13	1.34 EPR	170	2,397	2,095	6.79	0.32	94.1
12	4	C-17	C17IPE	PAT	17LC14	1.14 EPR	160	1,867	1,247	1.56	0.09	93.2
12	5	C-17	C17VPE	PAT	17RC44	1.14 EPR	180	2,603	1,247	2.27	0.24	92.0
12	6	C-17	C17VPJ	PAT	17LC42	1.14 EPR	180	2,390	1,299	0.46	0.00	91.9
12	7	C-17	C17TDH	DEP	35RD32	1.34 EPR	160	3,420	2,438	0.55	0.00	91.9
12	8	C-17	C17A17	ARR	17LA33	1.15 EPR	160	2,518	1,323	2.71	0.09	91.8
12	9	C-17	C17VPX	PAT	35RC42	1.34 EPR	170	3,679	2,655	0.25	0.00	91.1
12	10	C-17	C17VPW	PAT	35RC44	1.34 EPR	170	3,679	2,655	0.34	0.00	91.1
13	1	T-38C	T38D4	DEP	35LD12	100.00 % RPM	250	2,243	3,699	0.19	0.00	92.7
13	2	T-38C	T38D3	DEP	35LD11	100.00 % RPM	250	2,243	3,699	0.19	0.00	92.6

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus FTU												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
13	3	T-38C	T38C4	PAT	35LC11	100.00 % RPM	165	1,897	3,632	0.24	0.00	91.5
13	4	T-38C	T38C3	PAT	35LC12	100.00 % RPM	165	1,897	3,632	0.24	0.00	91.5
13	5	T-38C	T38D1	DEP	17RD11	100.00 % RPM	0	1,382	3,595	0.36	0.00	91.4
13	6	T-38C	T38D2	DEP	17RD12	100.00 % RPM	0	1,382	3,595	0.36	0.00	91.4
13	7	C-17	C17TDF	DEP	35LD32	1.42 EPR	145	2,002	3,648	1.17	0.00	91.1
13	8	C-17	C17TDE	DEP	35LD31	1.42 EPR	185	1,662	3,606	1.17	0.00	89.8
13	9	C-17	C17VPS	PAT	35LC45	1.34 EPR	140	1,854	3,626	0.23	0.02	89.6
13	10	C-17	C17VPR	PAT	35LC44	1.34 EPR	140	1,854	3,626	1.22	0.13	89.6
14	1	C-17	C17VPA	PAT	17RC13	1.34 EPR	170	2,729	1,415	0.44	0.03	98.1
14	2	C-17	C17VPB	PAT	17RC16	1.34 EPR	170	2,752	1,770	1.62	0.16	96.2
14	3	KC-46X	46C4	PAT	17LC4	85.00 % N1	180	2,204	888	0.45	0.07	95.7
14	4	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,420	2,789	14.61	1.42	92.5
14	5	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,420	2,789	12.62	0.59	92.5
14	6	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,420	2,789	3.91	0.26	92.5
14	7	C-17	C17VPC	PAT	17RC17	1.34 EPR	170	2,748	2,651	2.29	0.11	92.5
14	8	C-17	C17VPM	PAT	35LC13	1.20 EPR	160	2,900	1,758	0.23	0.02	90.0
14	9	C-17	C17A40	ARR	35LA32	1.10 EPR	180	2,900	1,758	0.30	0.21	86.5
14	10	C-17	C17TDD	DEP	17RD32	1.34 EPR	250	4,756	4,654	2.17	0.00	86.2
15	1	T-38C	T38C4	PAT	35LC11	100.00 % RPM	165	2,289	971	0.24	0.00	106.3
15	2	T-38C	T38C3	PAT	35LC12	100.00 % RPM	165	2,289	971	0.24	0.00	106.3
15	3	C-17	C17VPO	PAT	35LC17	1.34 EPR	170	1,928	594	1.23	0.06	105.9
15	4	C-17	C17VPM	PAT	35LC13	1.34 EPR	170	1,973	636	0.23	0.02	105.2
15	5	C-17	C17VPN	PAT	35LC16	1.34 EPR	170	1,973	636	0.87	0.09	105.2
15	6	C-17	C17A24	ARR	17RA32	1.14 EPR	140	1,580	407	0.55	0.39	103.7
15	7	C-17	C17A35	ARR	17RA34	1.14 EPR	140	1,580	407	0.55	0.39	103.6
15	8	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	1,627	431	0.78	0.05	103.5
15	9	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	1,627	431	0.78	0.05	103.5
15	10	C-17	C17A18	ARR	17RA21	1.15 EPR	125	1,608	421	0.08	0.06	103.4
16	1	C-17	C17CPWA	PAT	17RCW	1.34 EPR	170	2,167	2,230	8.41	0.39	94.9
16	2	T-38C	T38C1	PAT	17RC11	100.00 % RPM	165	2,330	3,767	0.45	0.00	90.5
16	3	T-38C	T38C2	PAT	17RC12	100.00 % RPM	165	2,330	3,767	0.45	0.00	90.5
16	4	T-38C	T38D1	DEP	17RD11	100.00 % RPM	250	3,054	4,020	0.36	0.00	89.6
16	5	T-38C	T38D2	DEP	17RD12	100.00 % RPM	250	3,054	4,020	0.36	0.00	89.6
16	6	C-17	C17TDC	DEP	17RD31	1.42 EPR	250	2,270	3,761	2.17	0.00	88.8
16	7	C-17	C17TDD	DEP	17RD32	1.34 EPR	160	2,442	3,907	2.17	0.00	88.8
16	8	C-17	TC17D2	DEP	17RD12	1.34 EPR	160	2,459	3,803	0.06	0.00	88.7
16	9	C-17	TC17D1	DEP	17RD11	1.34 EPR	160	2,459	3,803	0.06	0.00	88.7
16	10	C-17	C17DB	DEP	17RD11	1.34 EPR	160	2,459	3,803	3.44	0.28	88.7

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
1	1	C-17	C17VPE	PAT	17RC44	1.14 EPR	180	1,474	71	2.27	0.24	109.0
1	2	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	2,179	798	7.86	0.77	102.9
1	3	C-17	C17A16	ARR	17LA32	1.14 EPR	160	1,809	543	0.18	0.01	101.4
1	4	C-17	C17IPE	PAT	17LC14	1.14 EPR	160	1,784	552	1.56	0.09	100.7
1	5	C-17	C17A8	ARR	17AA33	1.15 EPR	160	1,805	631	4.28	0.27	98.9
1	6	C-17	C17VPK	PAT	17LC44	1.14 EPR	180	2,184	807	0.63	0.00	96.8
1	7	C-17	C17A15	ARR	17LA32	1.14 EPR	180	2,244	802	0.18	0.01	96.6
1	8	C-17	C17DD	DEP	35RD11	1.34 EPR	160	2,784	1,868	0.89	0.00	95.2
1	9	KC-135R	135RCB	PAT	17LC14	65.00 % NF	160	1,784	552	0.46	0.07	94.3
1	10	C-17	C17IPF	PAT	35RC14	1.30 EPR	160	2,679	1,795	0.84	0.05	93.8
2	1	C-17	C17A46	ARR	35RA32	1.10 EPR	200	2,000	736	0.10	0.00	97.1
2	2	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,651	2,395	14.61	1.42	92.3
2	3	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,651	2,395	12.62	0.59	92.3
2	4	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,651	2,395	3.91	0.26	92.3
2	5	KC-46X	46RCX	PAT	35RC13	60.00 % N1	180	1,702	476	1.21	0.14	91.4
2	6	C-17	C17VPP	PAT	35RC13	1.20 EPR	160	2,900	1,604	6.79	0.32	90.7
2	7	C-17	C17VPO	PAT	35LC17	1.20 EPR	160	2,900	1,603	1.23	0.06	90.6
2	8	KC-135R	135RDC	DEP	17LD32	92.00 % NF	185	2,841	1,904	0.19	0.03	88.8
2	9	C-17	C17TDB	DEP	17LD32	1.34 EPR	250	4,506	3,394	1.03	0.00	88.5
2	10	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	4,949	3,798	0.46	0.00	88.2
3	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	250	2,915	1,499	0.24	0.00	101.5
3	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	250	2,915	1,499	0.24	0.00	101.5
3	3	C-17	C17A18	ARR	17RA21	1.15 EPR	125	2,066	685	0.08	0.06	99.4
3	4	C-17	C17A19	ARR	17RA22	1.14 EPR	125	2,096	712	0.08	0.06	98.9
3	5	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	2,135	749	0.78	0.05	98.5
3	6	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	2,135	749	0.78	0.05	98.5
3	7	C-17	TC17A1	ARR	17RA11	1.14 EPR	140	2,119	733	0.09	0.03	98.3
3	8	C-17	C17AB	ARR	17RA11	1.14 EPR	140	2,119	733	1.25	0.00	98.3
3	9	C-17	C17VPI	PAT	17LC17	1.10 EPR	160	2,018	710	3.91	0.26	98.2
3	10	C-17	C17VPA	PAT	17RC13	1.10 EPR	160	2,020	711	0.44	0.03	98.2
4	1	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,034	945	14.61	1.42	102.1
4	2	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,034	945	12.62	0.59	102.1
4	3	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,034	945	3.91	0.26	102.1
4	4	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	2,537	1,658	1.03	0.00	97.4
4	5	C-17	C17TDA	DEP	17LD31	1.42 EPR	250	2,262	1,654	1.03	0.00	96.6
4	6	C-17	C17DA	DEP	17LD11	1.34 EPR	160	2,457	1,751	1.64	0.00	96.2
4	7	C-17	C17VPK	PAT	17LC44	1.34 EPR	170	2,726	1,781	0.63	0.00	96.1
4	8	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	2,726	1,781	0.46	0.00	96.1
4	9	C-17	C17VPL	PAT	17LC45	1.34 EPR	170	2,726	1,781	0.12	0.00	96.1
4	10	C-17	C17A42	ARR	35RA33	1.15 EPR	160	991	971	1.46	0.05	95.9
5	1	C-17	C17VPO	PAT	35LC17	1.34 EPR	170	2,255	996	1.23	0.06	101.2

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
5	2	C-17	C17VPM	PAT	35LC13	1.34 EPR	170	2,360	1,088	0.23	0.02	100.5
5	3	C-17	C17VPN	PAT	35LC16	1.34 EPR	170	2,360	1,088	0.87	0.09	100.5
5	4	C-17	C17TDH	DEP	35RD32	1.34 EPR	160	2,382	1,632	0.55	0.00	98.3
5	5	C-17	C17VPP	PAT	35RC13	1.34 EPR	170	1,943	1,517	6.79	0.32	98.0
5	6	KC-46X	46C9	PAT	35RC4	85.00 % N1	180	2,000	683	0.20	0.02	97.1
5	7	C-17	C17TDG	DEP	35RD31	1.42 EPR	250	1,882	1,656	0.55	0.00	96.6
5	8	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	1,884	1,655	7.86	0.77	96.5
5	9	C-17	C17VPX	PAT	35RC42	1.34 EPR	170	2,530	1,742	0.25	0.00	96.5
5	10	C-17	C17VPW	PAT	35RC44	1.34 EPR	170	2,530	1,742	0.34	0.00	96.5
6	1	C-17	C17A46	ARR	35RA32	1.10 EPR	200	2,000	727	0.10	0.00	96.7
6	2	KC-46X	46C4	PAT	17LC4	85.00 % N1	180	2,446	876	0.47	0.05	94.3
6	3	C-17	C17IPE	PAT	17LC14	1.20 EPR	160	1,982	1,454	1.56	0.09	92.8
6	4	C-17	C17VPH	PAT	17LC16	1.10 EPR	160	2,899	1,594	14.61	1.42	91.8
6	5	C-17	C17VPG	PAT	17LC13	1.10 EPR	160	2,899	1,594	12.62	0.59	91.8
6	6	C-17	C17VPI	PAT	17LC17	1.10 EPR	160	2,899	1,594	3.91	0.26	91.7
6	7	C-17	C17VPO	PAT	35LC17	1.20 EPR	160	2,900	1,594	1.23	0.06	91.0
6	8	C-17	C17VPP	PAT	35RC13	1.20 EPR	160	2,900	1,594	6.79	0.32	91.0
6	9	C-17	C17VPU	PAT	35RC16	1.20 EPR	160	2,898	1,592	7.86	0.77	90.8
6	10	C-17	C17VPN	PAT	35LC16	1.20 EPR	160	2,899	1,593	0.87	0.09	90.8
7	1	C-17	C17TDH	DEP	35RD32	1.40 EPR	0	1,382	1,609	0.55	0.00	101.4
7	2	C-17	C17TDG	DEP	35RD31	1.40 EPR	0	1,382	1,609	0.55	0.00	101.3
7	3	C-17	C17TDB	DEP	17LD32	1.42 EPR	145	1,751	1,660	1.03	0.00	98.7
7	4	C-17	C17TDA	DEP	17LD31	1.42 EPR	145	1,530	1,620	1.03	0.00	97.9
7	5	KC-135R	135RDL	DEP	35RD32	88.00 % NF	0	1,382	1,609	0.13	0.02	97.5
7	6	KC-135R	135RDK	DEP	35RD12	88.00 % NF	0	1,382	1,609	0.00	0.00	97.5
7	7	KC-135R	135RDJ	DEP	35RD11	88.00 % NF	0	1,382	1,609	0.01	0.00	97.5
7	8	C-17	C17DA	DEP	17LD11	1.34 EPR	130	1,751	1,660	1.64	0.00	97.1
7	9	C-17	C17VPK	PAT	17LC44	1.34 EPR	140	1,636	1,635	0.63	0.00	96.8
7	10	C-17	C17VPJ	PAT	17LC42	1.34 EPR	140	1,636	1,635	0.46	0.00	96.8
8	1	C-17	C17IPF	PAT	35RC14	1.14 EPR	160	1,899	1,063	0.84	0.05	94.0
8	2	C-17	C17VPQ	PAT	35LC42	1.14 EPR	180	2,295	1,174	0.88	0.09	93.1
8	3	KC-135R	135RDC	DEP	17LD32	92.00 % NF	185	2,572	1,361	0.19	0.03	91.7
8	4	KC-46X	46RDC	DEP	17LD32	92.00 % N1	185	2,559	1,350	0.19	0.00	91.3
8	5	C-17	C17TDB	DEP	17LD32	1.34 EPR	160	3,892	2,656	1.03	0.00	91.0
8	6	C-17	C17VPJ	PAT	17LC42	1.34 EPR	170	4,254	2,996	0.46	0.00	90.3
8	7	C-17	C17VPK	PAT	17LC44	1.34 EPR	170	4,254	2,996	0.63	0.00	90.3
8	8	C-17	C17VPL	PAT	17LC45	1.34 EPR	170	4,254	2,996	0.12	0.00	90.3
8	9	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,479	2,989	14.61	1.42	90.2

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
8	10	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,479	2,989	12.62	0.59	90.2
9	1	T-38C	T38C2	PAT	17RC12	100.00 % RPM	250	2,513	1,182	0.45	0.00	104.1
9	2	T-38C	T38C1	PAT	17RC11	100.00 % RPM	250	2,513	1,182	0.45	0.00	104.1
9	3	C-17	C17A40	ARR	35LA32	1.14 EPR	160	1,722	406	0.30	0.21	104.0
9	4	C-17	C17A36	ARR	35LA34	1.14 EPR	160	1,721	406	0.30	0.21	103.9
9	5	C-17	C17A39	ARR	35LA23	1.15 EPR	125	1,769	451	0.04	0.03	103.1
9	6	C-17	C17A38	ARR	35LA22	1.15 EPR	125	1,769	451	0.04	0.03	103.1
9	7	C-17	C17A37	ARR	35LA21	1.15 EPR	125	1,769	451	0.04	0.03	103.1
9	8	C-17	C17IPD	PAT	35LC12	1.14 EPR	140	1,786	467	0.42	0.03	102.9
9	9	C-17	C17IPC	PAT	35LC11	1.14 EPR	140	1,786	467	0.42	0.03	102.9
9	10	C-17	C17VPV	PAT	35RC17	1.10 EPR	140	1,744	423	2.11	0.14	102.9
10	1	T-38C	T38C1	PAT	17RC11	100.00 % RPM	250	2,686	1,627	0.45	0.00	100.5
10	2	T-38C	T38C2	PAT	17RC12	100.00 % RPM	250	2,686	1,627	0.45	0.00	100.5
10	3	C-17	C17VPV	PAT	35RC17	1.10 EPR	140	1,875	798	2.11	0.14	97.0
10	4	C-17	TC17D2	DEP	17RD12	1.34 EPR	160	2,863	1,777	0.06	0.00	95.7
10	5	C-17	TC17D1	DEP	17RD11	1.34 EPR	160	2,863	1,777	0.06	0.00	95.7
10	6	C-17	C17DB	DEP	17RD11	1.34 EPR	160	2,863	1,777	3.44	0.28	95.7
10	7	C-17	C17A40	ARR	35LA32	1.14 EPR	160	1,848	1,053	0.30	0.21	95.2
10	8	T-38C	T38D1	DEP	17RD11	100.00 % RPM	250	3,702	2,544	0.36	0.00	95.0
10	9	T-38C	T38D2	DEP	17RD12	100.00 % RPM	250	3,702	2,544	0.36	0.00	95.0
10	10	C-17	C17A36	ARR	35LA34	1.14 EPR	160	1,846	1,052	0.30	0.21	94.8
11	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	250	2,561	1,201	0.24	0.00	103.9
11	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	250	2,561	1,201	0.24	0.00	103.9
11	3	C-17	C17A24	ARR	17RA32	1.14 EPR	160	1,785	497	0.55	0.39	102.2
11	4	C-17	C17A35	ARR	17RA34	1.14 EPR	160	1,785	497	0.55	0.39	102.0
11	5	C-17	C17A18	ARR	17RA21	1.15 EPR	125	1,804	512	0.08	0.06	101.8
11	6	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	1,845	544	0.78	0.05	101.5
11	7	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	1,845	544	0.78	0.05	101.5
11	8	C-17	C17VPI	PAT	17LC17	1.10 EPR	140	1,777	490	3.91	0.26	101.4
11	9	C-17	C17A19	ARR	17RA22	1.14 EPR	125	1,822	526	0.08	0.06	101.4
11	10	C-17	C17VPA	PAT	17RC13	1.10 EPR	140	1,777	491	0.44	0.03	101.4
12	1	C-17	C17VPU	PAT	35RC16	1.34 EPR	170	2,445	1,533	7.86	0.77	97.6
12	2	C-17	C17VPF	PAT	17RC42	1.14 EPR	180	2,113	992	1.64	0.16	94.4
12	3	C-17	C17VPP	PAT	35RC13	1.34 EPR	170	2,397	2,095	6.79	0.32	94.1
12	4	C-17	C17IPE	PAT	17LC14	1.14 EPR	160	1,867	1,247	1.56	0.09	93.2
12	5	C-17	C17VPE	PAT	17RC44	1.14 EPR	180	2,603	1,247	2.27	0.24	92.0
12	6	C-17	C17VPJ	PAT	17LC42	1.14 EPR	180	2,390	1,299	0.46	0.00	91.9
12	7	C-17	C17TDH	DEP	35RD32	1.34 EPR	160	3,420	2,438	0.55	0.00	91.9

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
12	8	C-17	C17A17	ARR	17LA33	1.15 EPR	160	2,518	1,323	2.71	0.09	91.8
12	9	C-17	C17VPX	PAT	35RC42	1.34 EPR	170	3,679	2,655	0.25	0.00	91.1
12	10	C-17	C17VPW	PAT	35RC44	1.34 EPR	170	3,679	2,655	0.34	0.00	91.1
13	1	T-38C	T38D4	DEP	35LD12	100.00 % RPM	250	2,243	3,699	0.19	0.00	92.7
13	2	T-38C	T38D3	DEP	35LD11	100.00 % RPM	250	2,243	3,699	0.19	0.00	92.6
13	3	T-38C	T38C4	PAT	35LC11	100.00 % RPM	165	1,897	3,632	0.24	0.00	91.5
13	4	T-38C	T38C3	PAT	35LC12	100.00 % RPM	165	1,897	3,632	0.24	0.00	91.5
13	5	T-38C	T38D1	DEP	17RD11	100.00 % RPM	0	1,382	3,595	0.36	0.00	91.4
13	6	T-38C	T38D2	DEP	17RD12	100.00 % RPM	0	1,382	3,595	0.36	0.00	91.4
13	7	C-17	C17TDF	DEP	35LD32	1.42 EPR	145	2,002	3,648	1.17	0.00	91.1
13	8	C-17	C17TDE	DEP	35LD31	1.42 EPR	185	1,662	3,606	1.17	0.00	89.8
13	9	C-17	C17VPS	PAT	35LC45	1.34 EPR	140	1,854	3,626	0.23	0.02	89.6
13	10	C-17	C17VPR	PAT	35LC44	1.34 EPR	140	1,854	3,626	1.22	0.13	89.6
14	1	C-17	C17VPA	PAT	17RC13	1.34 EPR	170	2,729	1,415	0.44	0.03	98.1
14	2	C-17	C17VPB	PAT	17RC16	1.34 EPR	170	2,752	1,770	1.62	0.16	96.2
14	3	KC-46X	46C4	PAT	17LC4	85.00 % N1	180	2,204	888	0.47	0.05	95.7
14	4	C-17	C17VPH	PAT	17LC16	1.34 EPR	170	2,420	2,789	14.61	1.42	92.5
14	5	C-17	C17VPG	PAT	17LC13	1.34 EPR	170	2,420	2,789	12.62	0.59	92.5
14	6	C-17	C17VPI	PAT	17LC17	1.34 EPR	170	2,420	2,789	3.91	0.26	92.5
14	7	C-17	C17VPC	PAT	17RC17	1.34 EPR	170	2,748	2,651	2.29	0.11	92.5
14	8	C-17	C17VPM	PAT	35LC13	1.20 EPR	160	2,900	1,758	0.23	0.02	90.0
14	9	C-17	C17A40	ARR	35LA32	1.10 EPR	180	2,900	1,758	0.30	0.21	86.5
14	10	C-17	C17TDD	DEP	17RD32	1.34 EPR	250	4,756	4,654	2.17	0.00	86.2
15	1	T-38C	T38C3	PAT	35LC12	100.00 % RPM	165	2,289	971	0.24	0.00	106.3
15	2	T-38C	T38C4	PAT	35LC11	100.00 % RPM	165	2,289	971	0.24	0.00	106.3
15	3	C-17	C17VPO	PAT	35LC17	1.34 EPR	170	1,928	594	1.23	0.06	105.9
15	4	C-17	C17VPM	PAT	35LC13	1.34 EPR	170	1,973	636	0.23	0.02	105.2
15	5	C-17	C17VPN	PAT	35LC16	1.34 EPR	170	1,973	636	0.87	0.09	105.2
15	6	C-17	C17A24	ARR	17RA32	1.14 EPR	140	1,580	407	0.55	0.39	103.7
15	7	C-17	C17A35	ARR	17RA34	1.14 EPR	140	1,580	407	0.55	0.39	103.6
15	8	C-17	C17IPA	PAT	17RC11	1.14 EPR	140	1,627	431	0.78	0.05	103.5
15	9	C-17	C17IPB	PAT	17RC12	1.14 EPR	140	1,627	431	0.78	0.05	103.5
15	10	C-17	C17A18	ARR	17RA21	1.15 EPR	125	1,608	421	0.08	0.06	103.4
16	1	C-17	C17CPWA	PAT	17RCW	1.34 EPR	170	2,167	2,230	8.41	0.39	94.9
16	2	T-38C	T38C1	PAT	17RC11	100.00 % RPM	165	2,330	3,767	0.45	0.00	90.5

Table C-1-1. Noise Contributors at Representative Locations Near Altus AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

Altus MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Dist. (ft)	Operations		SEL (dB)
										Day	Night	
16	3	T-38C	T38C2	PAT	17RC12	100.00 % RPM	165	2,330	3,767	0.45	0.00	90.5
16	4	T-38C	T38D1	DEP	17RD11	100.00 % RPM	250	3,054	4,020	0.36	0.00	89.6
16	5	T-38C	T38D2	DEP	17RD12	100.00 % RPM	250	3,054	4,020	0.36	0.00	89.6
16	6	C-17	C17TDC	DEP	17RD31	1.42 EPR	250	2,270	3,761	2.17	0.00	88.8
16	7	C-17	C17TDD	DEP	17RD32	1.34 EPR	160	2,442	3,907	2.17	0.00	88.8
16	8	C-17	TC17D2	DEP	17RD12	1.34 EPR	160	2,459	3,803	0.06	0.00	88.7
16	9	C-17	TC17D1	DEP	17RD11	1.34 EPR	160	2,459	3,803	0.06	0.00	88.7
16	10	C-17	C17DB	DEP	17RD11	1.34 EPR	160	2,459	3,803	3.44	0.28	88.7

Key: ARR= Arrival; DEP= Departure; PAT= Closed Pattern.
Power Units: EPR: engine pressure ratio; N1 = engine speed at Location No. 1; NF = engine fan revolutions per minute; RPM = revolutions per minute.
Source: NOISEMAP Version 7.2.

Table C-1-2. Noise Contributors at Representative Locations Near Fairchild AFB Under Baseline and MOB 1 Scenario

Fairchild Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,010	2,725	0.04	0.00	113.5
1	2	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,207	3,589	0.05	0.00	103.7
1	3	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	4,987	0.11	0.00	101.4
1	4	F-18A/C	F18DB	DEP	23D03	95.00 % NC	0	2,462	4,987	0.16	0.00	97.9
1	5	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,745	2,202	0.16	0.00	97.9
1	6	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,340	2,925	0.01	0.00	97.0
1	7	C-9A	C9DB	DEP	23D04	2.00 EPR	0	2,462	4,987	0.02	0.00	95.9
1	8	C-9A	C9DA	DEP	05D04	2.00 EPR	200	4,124	2,789	0.01	0.00	95.7
1	9	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,692	2,194	0.11	0.00	95.0
1	10	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	94.9
2	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	5,269	3,005	0.11	0.00	112.6
2	2	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	3,164	1,252	0.05	0.00	103.2
2	3	EA-6B	EA6AA	ARR	05A03	75.00 % RPM	160	3,015	1,174	0.04	0.00	101.1
2	4	F-18A/C	F18DB	DEP	23D03	94.00 % NC	300	6,571	4,341	0.16	0.00	99.5
2	5	F-16C	F16DB	DEP	23D04	90.00 % NC	350	5,391	3,193	0.02	0.00	94.8
2	6	C-9A	C9DB	DEP	23D04	1.80 EPR	250	5,164	2,906	0.02	0.00	91.2
2	7	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	12,559	0.04	0.00	90.9
2	8	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	90.1
2	9	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	90.0
2	10	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	90.0
3	1	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	5,742	0.04	0.00	110.6
3	2	EA-6B	EA6DB	DEP	23D03	99.50 % RPM	145	3,032	5,759	0.11	0.00	109.2
3	3	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	5,742	0.05	0.00	107.6
3	4	AH-1W	UH1I04	INT	UH1I04	n/a*	n/a*	n/a*	n/a*	0.19	0.01	104.5
3	5	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	3,994	5,918	0.16	0.00	103.2
3	6	F-16C	F16DA	DEP	05D04	91.50 % NC	0	2,462	5,742	0.01	0.00	98.0
3	7	F-16C	F16DB	DEP	23D04	91.00 % NC	300	3,586	5,830	0.02	0.00	94.5
3	4	AH-1W	UH1I02	INT	UH1I02	n/a*	n/a*	n/a*	n/a*	0.04	0.01	93.8
3	9	C-9A	C9DA	DEP	05D04	2.00 EPR	0	2,462	5,742	0.01	0.00	92.8
3	10	C-9A	C9DB	DEP	23D04	2.00 EPR	115	3,316	5,789	0.02	0.00	91.7
4	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	3,427	2,301	0.11	0.00	115.8
4	2	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	2,257	0.04	0.00	109.4
4	3	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	4,588	2,993	0.16	0.00	106.2
4	4	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	2,257	0.05	0.00	105.9
4	5	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	103.2
4	6	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	103.1
4	7	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0	103.1
4	8	AH-1W	UH1D02	DEP	UH1D02	n/a*	n/a*	n/a*	n/a*	0.01	0	102.5
4	9	F-16C	F16DB	DEP	23D04	91.00 % NC	300	3,955	2,564	0.02	0.00	98.7
4	10	AH-1W	UH1A05	ARR	UH1A05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	98.0
5	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,258	2,181	0.04	0.00	115.6
5	2	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,837	883	0.16	0.00	105.8
5	3	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	105.2
5	4	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,470	3,301	0.05	0.00	104.3
5	5	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,763	849	0.11	0.00	103.8
5	6	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	102.2
5	7	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	6,292	0.11	0.00	99.2

Table C-1-2. Noise Contributors at Representative Locations Near Fairchild AFB Under Baseline and MOB 1 Scenario (Continued)

Fairchild Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
5	8	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,527	2,271	0.01	0.00	99.1
5	9	AH-1W	UH1I03	INT	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	98.7
5	10	C-9A	C9DA	DEP	05D04	2.00 EPR	200	4,371	2,132	0.01	0.00	97.8
6	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,629	2,945	0.04	0.00	112.4
6	2	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,984	614	0.16	0.00	108.9
6	3	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,876	508	0.11	0.00	108.0
6	4	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	106.5
6	5	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	103.9
6	6	C-17	C17CD	PAT	23C2	70.00 % NC	150	2,512	178	0.12	0.00	102.4
6	7	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,865	3,992	0.05	0.00	101.6
6	8	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,825	2,459	0.01	0.00	97.9
6	9	AH-1W	UH1I03	DEP	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	97.9
6	10	C-9A	C9AB	ARR	23A01	1.35 EPR	135	3,000	630	0.02	0.00	96.2
7	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	3,555	3,174	0.11	0.00	112.4
7	2	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	3,391	0.04	0.00	104.9
7	3	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	4,723	3,767	0.16	0.00	103.9
7	4	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	3,391	0.05	0.00	102.2
7	5	F-16C	F16DB	DEP	23D04	91.00 % NC	300	4,039	3,375	0.02	0.00	96.1
7	6	C-9A	C9DB	DEP	23D04	2.00 EPR	115	3,784	3,260	0.02	0.00	94.7
7	7	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	2,597	2,966	0.05	0.00	94.0
7	8	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	93.5
7	9	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	93.5
7	10	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	93.5
8	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	4,463	2,055	0.11	0.00	116.3
8	2	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	2,889	455	0.05	0.00	111.2
8	3	EA-6B	EA6AA	ARR	05A03	75.00 % RPM	160	2,803	368	0.04	0.00	110.5
8	4	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	5,680	3,295	0.16	0.00	104.3
8	5	C-17	C17CC	PAT	05C2	70.00 % NC	150	2,512	77	0.04	0.00	102.4
8	6	F-16C	F16DB	DEP	23D04	91.00 % NC	300	4,633	2,210	0.02	0.00	99.3
8	7	C-9A	C9AA	ARR	05A01	1.35 EPR	135	2,902	467	0.01	0.00	99.1
8	8	KC-135R	T135AA	ARR	05A01	66.50 % NF	150	2,766	331	0.15	0.02	98.3
8	9	F-16C	F16AA	ARR	05A01	80.00 % NC	160	2,803	368	0.01	0.00	98.0
8	10	C-17	C17AA	ARR	05A01	70.00 % NC	140	2,803	368	0.08	0.00	98.0
9	1	EA-6B	EA6DB	DEP	23D03	99.50 % RPM	145	3,055	4,405	0.11	0.00	109.8
9	2	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	4,366	0.04	0.00	107.2
9	3	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	4,366	0.05	0.00	104.3
9	4	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	4,046	4,649	0.16	0.00	103.0
9	5	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	99.8
9	6	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	99.6
9	7	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	99.6
9	8	AH-1W	UH1I01	INT	UH1I01	n/a*	n/a*	n/a*	n/a*	0.09	0.01	96.4
9	9	F-16C	F16DA	DEP	05D04	91.50 % NC	0	2,462	4,366	0.01	0.00	95.2
9	10	AH-1W	UH1A05	ARR	UH1A05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	95.0
10	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	3,638	2,194	0.04	0.00	116.0
10	2	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	2,820	0.11	0.00	109.7
10	3	F-18A/C	F18DB	DEP	23D03	95.00 % NC	0	2,462	2,820	0.16	0.00	106.8

Table C-1-2. Noise Contributors at Representative Locations Near Fairchild AFB Under Baseline and MOB 1 Scenario (Continued)

Fairchild Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
10	4	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	4,810	3,035	0.05	0.00	105.8
10	5	C-9A	C9DB	DEP	23D04	2.00 EPR	0	2,462	2,820	0.02	0.00	104.5
10	6	F-16C	F16DB	DEP	23D04	91.50 % NC	0	2,462	2,820	0.02	0.00	103.5
10	7	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,624	1,818	0.16	0.00	99.1
10	8	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,094	2,476	0.01	0.00	98.8
10	9	C-9A	C9DA	DEP	05D04	2.00 EPR	115	3,840	2,310	0.01	0.00	97.9
10	10	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,599	1,815	0.11	0.00	96.4
11	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	4,034	2,387	0.11	0.00	115.0
11	2	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	5,228	3,348	0.16	0.00	104.6
11	3	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	2,752	1,750	0.05	0.00	100.0
11	4	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	98.4
11	5	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	98.4
11	6	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	98.3
11	7	C-17	C17CD	PAT	23C2	89.60 % NC	190	3,036	519	0.12	0.00	98.3
11	8	F-16C	F16DB	DEP	23D04	91.00 % NC	300	4,353	2,610	0.02	0.00	98.0
11	9	EA-6B	EA6AA	ARR	05A03	75.00 % RPM	160	2,697	1,740	0.04	0.00	97.3
11	10	C-9A	C9DB	DEP	23D04	2.00 EPR	200	4,141	2,459	0.02	0.00	96.8
12	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,108	3,243	0.04	0.00	112.9
12	2	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	112.8
12	3	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	111.2
12	4	AH-1W	UH1I03	INT	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	103.6
12	5	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,273	4,016	0.05	0.00	103.2
12	6	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	5,513	0.11	0.00	100.1
12	7	AH-1W	UH1A04	ARR	UH1A04	n/a*	n/a*	n/a*	n/a*	0.72	0.04	99.2
12	8	AH-1W	UH1D02	DEP	UH1D02	n/a*	n/a*	n/a*	n/a*	0.01	0.00	98.5
12	9	AH-1W	UH1C02	PAT	UH1C02	n/a*	n/a*	n/a*	n/a*	0.28	0.02	98.1
12	10	C-17	C17CC	PAT	05C2	89.60 % NC	190	3,044	436	0.04	0.00	97.2
13	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,189	1,929	0.04	0.00	117.3
13	2	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	110.7
13	3	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	109.9
13	4	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,385	3,099	0.05	0.00	105.3
13	5	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,793	941	0.16	0.00	105.3
13	6	AH-1W	UH1I03	INT	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	104.0
13	7	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,729	917	0.11	0.00	103.1
13	8	AH-1W	UH1A06	ARR	UH1A06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	101.8
13	9	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	5,475	0.11	0.00	100.7
13	10	AH-1W	UH1D02	DEP	UH1D02	n/a*	n/a*	n/a*	n/a*	0.01	0.00	100.5
Fairchild MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,010	2,724	0.04	0.00	113.9
1	2	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,207	3,588	0.05	0.00	103.6
1	3	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	4,987	0.11	0.00	101.9
1	4	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,745	2,202	0.16	0.00	98.0
1	5	F-18A/C	F18DB	DEP	23D03	95.00 % NC	0	2,462	4,987	0.16	0.00	97.9
1	6	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,340	2,923	0.01	0.00	97.0

Table C-1-2. Noise Contributors at Representative Locations Near Fairchild AFB Under Baseline and MOB 1 Scenario (Continued)

Fairchild MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	7	C-9A	C9DA	DEP	05D04	2.00 EPR	200	4,124	2,788	0.01	0.00	95.6
1	8	C-9A	C9DB	DEP	23D04	2.00 EPR	0	2,462	4,987	0.02	0.00	95.6
1	9	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,692	2,194	0.11	0.00	95.4
1	10	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	94.9
2	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	5,269	2,994	0.11	0.00	113.0
2	2	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	3,164	1,250	0.05	0.00	103.5
2	3	EA-6B	EA6AA	ARR	05A03	75.00 % RPM	160	3,015	1,173	0.04	0.00	101.6
2	4	F-18A/C	F18DB	DEP	23D03	94.00 % NC	300	6,571	4,330	0.16	0.00	99.3
2	5	F-16C	F16DB	DEP	23D04	90.00 % NC	350	5,391	3,182	0.02	0.00	94.8
2	6	C-9A	C9DB	DEP	23D04	1.80 EPR	250	5,164	2,895	0.02	0.00	91.2
2	7	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	12,559	0.04	0.00	90.5
2	8	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	90.2
2	9	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	90.1
2	10	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	90.1
3	1	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	5,744	0.04	0.00	109.7
3	2	EA-6B	EA6DB	DEP	23D03	99.50 % RPM	145	3,032	5,759	0.11	0.00	108.2
3	3	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	5,744	0.05	0.00	106.4
3	4	AH-1W	UH1I04	INT	UH1I04	n/a*	n/a*	n/a*	n/a*	0.19	0.01	104.7
3	5	F-16C	F16DA	DEP	05D04	91.50 % NC	0	2,462	5,744	0.01	0.00	96.8
3	6	AH-1W	UH1I02	INT	UH1I02	n/a*	n/a*	n/a*	n/a*	0.04	0.01	94.5
3	7	F-16C	F16DB	DEP	23D04	91.00 % NC	300	3,586	5,830	0.02	0.00	91.6
3	8	C-9A	C9DA	DEP	05D04	2.00 EPR	0	2,462	5,744	0.01	0.00	91.6
3	9	C-9A	C9DB	DEP	23D04	2.00 EPR	115	3,316	5,788	0.02	0.00	90.3
3	10	KC-135R	T135DA	DEP	05D04	89.60 % NF	30	2,462	5,744	0.15	0.02	89.9
4	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	3,427	2,301	0.11	0.00	116.3
4	2	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	2,255	0.04	0.00	109.8
4	3	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	4,587	2,994	0.16	0.00	106.3
4	4	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	2,255	0.05	0.00	106.1
4	5	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	103.2
4	6	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	103.1
4	7	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0	103.1
4	8	AH-1W	UH1D02	DEP	UH1D02	n/a*	n/a*	n/a*	n/a*	0.01	0	102.5
4	9	F-16C	F16DB	DEP	23D04	91.00 % NC	300	3,955	2,565	0.02	0.00	98.8
4	10	AH-1W	UH1A05	ARR	UH1A05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	98.0
5	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,258	2,181	0.04	0.00	116.2
5	2	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,837	883	0.16	0.00	106.1
5	3	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	105.2
5	4	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,470	3,301	0.05	0.00	104.2
5	5	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,763	849	0.11	0.00	104.2
5	6	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	102.2
5	7	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	6,292	0.11	0.00	100.2
5	8	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,527	2,271	0.01	0.00	99.3
5	9	AH-1W	UH1I03	INT	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	98.7
5	10	C-9A	C9DA	DEP	05D04	2.00 EPR	200	4,370	2,132	0.01	0.00	97.9
6	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,630	2,941	0.04	0.00	112.8
6	2	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,984	610	0.16	0.00	109.2

Table C-1-2. Noise Contributors at Representative Locations Near Fairchild AFB Under Baseline and MOB 1 Scenario (Continued)

Fairchild MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
6	3	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,876	504	0.11	0.00	108.3
6	4	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	106.6
6	5	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	103.9
6	6	C-17	C17CD	PAT	23C2	70.00 % NC	150	2,512	175	0.12	0.00	102.6
6	7	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,865	3,988	0.05	0.00	101.4
6	8	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,825	2,455	0.01	0.00	98.1
6	9	AH-1W	UH1I03	DEP	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	97.9
6	10	C-9A	C9AB	ARR	23A01	1.35 EPR	135	3,000	625	0.02	0.00	97.4
7	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	3,555	3,174	0.11	0.00	112.7
7	2	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	3,394	0.04	0.00	105.3
7	3	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	4,723	3,768	0.16	0.00	103.8
7	4	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	3,394	0.05	0.00	102.3
7	5	F-16C	F16DB	DEP	23D04	91.00 % NC	300	4,039	3,376	0.02	0.00	96.0
7	6	C-9A	C9DB	DEP	23D04	2.00 EPR	115	3,784	3,261	0.02	0.00	94.5
7	7	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	2,597	2,970	0.05	0.00	93.9
7	8	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	93.5
7	9	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	93.5
7	10	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	93.5
8	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	4,463	2,047	0.11	0.00	116.9
8	2	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	2,889	446	0.05	0.00	111.5
8	3	EA-6B	EA6AA	ARR	05A03	75.00 % RPM	160	2,803	359	0.04	0.00	111.0
8	4	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	5,680	3,286	0.16	0.00	104.3
8	5	C-17	C17CC	PAT	05C2	70.00 % NC	150	2,512	67	0.04	0.00	102.6
8	6	C-9A	C9AA	ARR	05A01	1.35 EPR	135	2,902	458	0.01	0.00	100.2
8	7	F-16C	F16DB	DEP	23D04	91.00 % NC	300	4,633	2,202	0.02	0.00	99.5
8	8	KC-135R	T135AA	ARR	05A01	66.50 % NF	150	2,766	322	0.15	0.02	98.7
8	9	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	7,246	0.04	0.00	98.5
8	10	C-17	C17AA	ARR	05A01	70.00 % NC	140	2,803	359	0.08	0.00	98.4
9	1	EA-6B	EA6DB	DEP	23D03	99.50 % RPM	145	3,055	4,405	0.11	0.00	109.8
9	2	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	4,363	0.04	0.00	107.2
9	3	F-18A/C	F18DA	DEP	05D03	95.00 % NC	0	2,462	4,363	0.05	0.00	103.9
9	4	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	4,046	4,649	0.16	0.00	102.7
9	5	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	99.8
9	6	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	99.6
9	7	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	99.6
9	8	AH-1W	UH1I01	INT	UH1I01	n/a*	n/a*	n/a*	n/a*	0.09	0.01	96.4
9	9	AH-1W	UH1A05	ARR	UH1A05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	95.0
9	10	F-16C	F16DA	DEP	05D04	91.50 % NC	0	2,462	4,363	0.01	0.00	94.9
10	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	3,638	2,193	0.04	0.00	116.5
10	2	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	2,820	0.11	0.00	110.4
10	3	F-18A/C	F18DB	DEP	23D03	95.00 % NC	0	2,462	2,820	0.16	0.00	106.9
10	4	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	4,810	3,034	0.05	0.00	105.8
10	5	C-9A	C9DB	DEP	23D04	2.00 EPR	0	2,462	2,820	0.02	0.00	104.5
10	6	F-16C	F16DB	DEP	23D04	91.50 % NC	0	2,462	2,820	0.02	0.00	103.5
10	7	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,624	1,818	0.16	0.00	99.3
10	8	F-16C	F16DA	DEP	05D04	91.00 % NC	300	4,094	2,475	0.01	0.00	98.9

Table C-1-2. Noise Contributors at Representative Locations Near Fairchild AFB Under Baseline and MOB 1 Scenario (Continued)

Fairchild MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
10	9	C-9A	C9DA	DEP	05D04	2.00 EPR	115	3,840	2,309	0.01	0.00	97.9
10	10	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,599	1,815	0.11	0.00	96.8
11	1	EA-6B	EA6DB	DEP	23D03	98.00 % RPM	250	4,034	2,390	0.11	0.00	115.5
11	2	F-18A/C	F18DB	DEP	23D03	96.70 % NC	250	5,228	3,351	0.16	0.00	104.6
11	3	EA-6B	EA6DA	DEP	05D03	99.00 % RPM	0	2,462	4,917	0.04	0.00	100.7
11	7	F-18A/C	F18AA	ARR	05A03	86.10 % NC	140	2,752	1,747	0.05	0.00	100.2
11	8	C-17	C17CD	PAT	23C2	89.60 % NC	190	3,036	524	0.12	0.00	99.5
11	9	F-16C	F16DB	DEP	23D04	91.00 % NC	300	4,353	2,613	0.02	0.00	98.1
11	4	AH-1W	UH1D06	DEP	UH1D06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	98.0
11	5	AH-1W	UH1D05	DEP	UH1D05	n/a*	n/a*	n/a*	n/a*	0.04	0.00	98.0
11	6	AH-1W	UH1D04	DEP	UH1D04	n/a*	n/a*	n/a*	n/a*	0.71	0.04	98.0
11	10	EA-6B	EA6AA	ARR	05A03	75.00 % RPM	160	2,697	1,736	0.04	0.00	97.8
12	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,108	3,243	0.04	0.00	113.2
12	2	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	113.0
12	3	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	111.1
12	4	AH-1W	UH1I03	INT	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	103.6
12	5	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,272	4,015	0.05	0.00	102.9
12	6	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	5,513	0.11	0.00	100.5
12	7	AH-1W	UH1A04	ARR	UH1A04	n/a*	n/a*	n/a*	n/a*	0.72	0.04	99.2
12	4	C-17	C17CC	PAT	05C2	89.60 % NC	190	3,044	434	0.04	0.00	98.6
12	8	AH-1W	UH1D02	DEP	UH1D02	n/a*	n/a*	n/a*	n/a*	0.01	0.00	98.5
12	9	AH-1W	UH1C02	PAT	UH1C02	n/a*	n/a*	n/a*	n/a*	0.28	0.02	98.1
13	1	EA-6B	EA6DA	DEP	05D03	98.00 % RPM	250	4,189	1,930	0.04	0.00	117.9
13	2	AH-1W	UH1D03	DEP	UH1D03	n/a*	n/a*	n/a*	n/a*	0.04	0.00	110.7
13	3	AH-1W	UH1D01	DEP	UH1D01	n/a*	n/a*	n/a*	n/a*	0.24	0.01	109.9
13	2	F-18A/C	F18AB	ARR	23A03	86.10 % NC	140	2,793	941	0.16	0.00	105.6
13	3	F-18A/C	F18DA	DEP	05D03	96.70 % NC	250	5,385	3,100	0.05	0.00	105.3
13	6	AH-1W	UH1I03	INT	UH1I03	n/a*	n/a*	n/a*	n/a*	0.28	0.02	104.0
13	4	EA-6B	EA6AB	ARR	23A03	75.00 % RPM	160	2,729	917	0.11	0.00	103.5
13	8	AH-1W	UH1A06	ARR	UH1A06	n/a*	n/a*	n/a*	n/a*	0.13	0.01	101.8
13	5	EA-6B	EA6DB	DEP	23D03	99.00 % RPM	0	2,462	5,475	0.11	0.00	101.7
13	10	AH-1W	UH1D02	DEP	UH1D02	n/a*	n/a*	n/a*	n/a*	0.01	0.00	100.5

Key: ARR= Arrival; DEP= Departure; INT= Interfacility; PAT= Closed Pattern; Power Units: EPR: engine pressure ratio; N1 = engine speed at Location No. 1; NC = core engine speed; RPM = revolutions per minute.
* = Rotorcraft Noise Model (RNM) is a simulation-based model and does not report SEL based on a single point of closest approach.
Source: NOISEMAP Version 7.2 and RNM.

Table C-1-3. Noise Contributors at Representative Locations Near Grand Forks AFB Under Baseline and MOB 1 Scenario

Grand Forks Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4,408	3,615	0.30	0.00	96.5
1	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4,609	3,831	0.00	0.15	94.5
1	3	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1,591	1,081	0.02	0.00	92.9
1	4	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1,591	1,081	0.03	0.00	92.1
1	5	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1,956	1,341	0.00	0.35	91.3
1	6	KC-135R	135AB	ARR	35A3	65.00 % NF	150	1,422	984	0.07	0.01	90.0
1	7	C-130H&N&P	130C	ARR	35A3	650.00 C TIT	110	1,418	982	0.02	0.00	89.5
1	8	T-45	MQ4AB	ARR	35A11	85.20 % RPM	180	1,463	1,006	0.00	0.70	88.6
1	9	C-20	C-20-C	ARR	35A3	2400.00 LBS	150	1,418	982	0.03	0.00	87.6
1	10	C-130H&N&P	130B	DEP	17D1	932.00 C TIT	170	2,341	1,659	0.01	0.00	87.0
2	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4,077	3,312	0.30	0.00	97.3
2	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4,187	3,436	0.00	0.15	95.7
2	3	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1,388	1,022	0.02	0.00	93.6
2	4	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1,388	1,022	0.03	0.00	92.7
2	5	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1,675	1,184	0.00	0.35	92.5
2	6	KC-135R	135AB	ARR	35A3	65.00 % NF	150	1,292	980	0.07	0.01	90.0
2	7	C-130H&N&P	130C	ARR	35A3	650.00 C TIT	110	1,289	979	0.02	0.00	89.3
2	8	T-45	MQ4AB	ARR	35A11	85.20 % RPM	180	1,321	992	0.00	0.70	88.7
2	9	C-130H&N&P	130B	DEP	17D1	977.00 C TIT	130	2,098	1,493	0.01	0.00	88.4
2	10	C-20	C-20-C	ARR	35A3	2400.00 LBS	150	1,289	979	0.03	0.00	87.6
3	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3,907	3,451	0.70	0.00	97.1
3	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	3,966	3,518	0.00	0.35	95.6
3	3	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1,771	1,857	0.00	0.15	89.5
3	4	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1,247	1,668	0.00	0.30	89.1
3	5	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1,299	1,680	0.07	0.01	88.9
3	6	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	160	1,299	1,680	0.04	0.00	88.4
3	7	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	130	1,973	1,959	0.02	0.00	86.4
3	8	KC-135R	135AA	ARR	17A1	65.00 % NF	150	1,209	1,660	0.03	0.00	85.5
3	9	C-130H&N&P	130D	ARR	17A1	650.00 C TIT	110	1,207	1,660	0.01	0.00	84.7
3	10	C-21A	C21A	DEP	35D1	96.00 % NC	180	2,872	2,575	0.02	0.00	84.5
4	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	4,176	5,194	0.70	0.00	92.8
4	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	4,302	5,288	0.00	0.35	91.2
4	3	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	2,091	4,181	0.00	0.15	82.9
4	4	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	8,415	0.30	0.00	81.7
4	5	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1,360	4,028	0.00	0.30	81.1
4	6	KC-135R	135DB	DEP	35D1	87.00 % NF	200	1,444	4,039	0.07	0.01	80.8
4	7	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	130	2,164	4,200	0.02	0.00	79.4
4	8	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	200	1,444	4,039	0.04	0.00	78.7
4	9	C-21A	C21A	DEP	35D1	96.00 % NC	180	3,104	4,579	0.02	0.00	78.6
4	10	KC-135R	135AA	ARR	17A1	65.00 % NF	150	1,307	4,022	0.03	0.00	76.9
5	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3,903	3,187	0.70	0.00	97.7
5	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	3,961	3,257	0.00	0.35	96.2
5	3	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	160	1,298	1,034	0.04	0.00	93.6
5	4	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1,245	1,015	0.00	0.30	93.0
5	5	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1,298	1,034	0.07	0.01	92.8
5	6	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1,766	1,301	0.00	0.15	92.0
5	7	KC-135R	135AA	ARR	17A1	65.00 % NF	150	1,207	1,002	0.03	0.00	89.7

Table C-1-3. Noise Contributors at Representative Locations Near Grand Forks AFB Under Baseline and MOB 1 Scenario (Continued)

Grand Forks Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
5	8	C-130H&N&P	130D	ARR	17A1	650.00 C TIT	110	1,205	1,001	0.01	0.00	89.0
5	9	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	130	1,970	1,444	0.02	0.00	89.0
5	10	C-20	C-20-A	ARR	17A1	2400.00 LBS	150	1,205	1,001	0.02	0.00	87.3
6	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4,077	5,408	0.30	0.00	92.4
6	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4,188	5,485	0.00	0.15	90.9
6	3	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1,676	4,440	0.00	0.35	82.8
6	4	T-45	MQ4DB	DEP	35D8	100.00 % RPM	0	911	7,991	0.70	0.00	82.5
6	5	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1,388	4,400	0.03	0.00	79.8
6	6	C-130H&N&P	130B	DEP	17D1	977.00 C TIT	130	2,099	4,532	0.01	0.00	78.3
6	7	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1,388	4,400	0.02	0.00	77.6
6	8	C-21A	C21B	DEP	17D1	96.00 % NC	180	3,025	4,859	0.01	0.00	77.4
6	9	CESSNA-441 TPROP	MQ9CB PCCB	PAT	17C8	50.00 % RPM	85	1,911	1,276	1.58	1.05	76.7
6	10	KC-135R	135AB	ARR	35A3	65.00 % NF	150	1,292	4,391	0.07	0.01	76.0
7	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3,814	9,974	0.70	0.00	85.1
7	2	T-45	MQ4CB	PAT	35C9	85.00 % RPM	200	6,911	8,248	0.00	0.35	83.4
7	3	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911 1	578	0.30	0.00	79.3
7	4	T-45	MQ4CA	PAT	17C9	85.00 % RPM	200	6,911	8,248	0.00	0.15	77.7
7	5	CESSNA-441 TPROP	MQ9CB PCD	PAT	35C8	75.00 % RPM	150	1,911	1,091	3.68	2.45	77.5
7	6	CESSNA-441 TPROP	MQ9CB PCCB	PAT	17C8	50.00 % RPM	85	1,911	1,488	1.58	1.05	75.8
7	7	C-130H&N&P	130A	DEP	35D1	932.00 C TIT	170	7,013	6,604	0.02	0.00	74.6
7	8	KC-135R	135DB	DEP	35D1	87.00 % NF	250	9,996	9,537	0.07	0.01	72.3
7	9	T-41	MQ1ND ANG~2	PAT	35C8	75.00 % RPM	150	2,000	1,173	6.86	0.00	72.1
7	10	C-21A	C21A	DEP	35D1	96.00 % NC	180	9,133	8,637	0.02	0.00	71.9
8	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3,324	5,319	0.70	0.00	92.6
8	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	180	3,324	5,319	0.00	0.35	91.3
8	3	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	5,209	0.30	0.00	86.4
8	4	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1,307	4,705	0.00	0.15	84.8
8	5	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1,202	4,696	0.07	0.01	79.5
8	6	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	130	1,696	4,754	0.02	0.00	78.6
8	7	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1,083	4,690	0.00	0.30	78.5
8	8	C-21A	C21A	DEP	35D1	96.00 % NC	180	2,534	4,967	0.02	0.00	77.7
8	9	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	160	1,202	4,696	0.04	0.00	77.3
8	10	C-21A	C21B	DEP	17D1	96.00 % NC	0	911	5,209	0.01	0.00	74.0
9	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4,408	3,935	0.30	0.00	95.6
9	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4,608	4,134	0.00	0.15	93.7
9	3	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1,955	2,048	0.00	0.35	88.1
9	4	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1,591	1,887	0.03	0.00	87.5
9	5	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1,591	1,887	0.02	0.00	86.8
9	6	KC-135R	135AB	ARR	35A3	65.00 % NF	150	1,421	1,833	0.07	0.01	84.8
9	7	C-130H&N&P	130B	DEP	17D1	932.00 C TIT	170	2,340	2,270	0.01	0.00	84.4
9	8	C-130H&N&P	130C	ARR	35A3	650.00 C TIT	110	1,418	1,832	0.02	0.00	84.1
9	9	T-45	MQ4AB	ARR	35A11	85.20 % RPM	180	1,463	1,845	0.00	0.70	83.8
9	10	C-21A	C21B	DEP	17D1	96.00 % NC	180	3,315	2,987	0.01	0.00	82.8
10	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	4,199	3,648	0.70	0.00	96.4

Table C-1-3. Noise Contributors at Representative Locations Near Grand Forks AFB Under Baseline and MOB 1 Scenario (Continued)

Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations Day	Operations Night	SEL (dB)
Grand Forks Baseline												
10	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	4,331	3,786	0.00	0.35	94.7
10	3	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1,370	1,545	0.00	0.30	89.8
10	4	KC-135R	135DB	DEP	35D1	87.00 % NF	200	1,458	1,575	0.07	0.01	89.2
10	5	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	2,118	1,925	0.00	0.15	88.8
10	6	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	200	1,458	1,575	0.04	0.00	88.8
10	7	KC-135R	135AA	ARR	17A1	65.00 % NF	150	1,315	1,529	0.03	0.00	86.3
10	8	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	130	2,180	1,959	0.02	0.00	86.0
10	9	C-130H&N&P	130D	ARR	17A1	650.00 C TIT	110	1,312	1,528	0.01	0.00	85.6
10	10	C-21A	C21A	DEP	35D1	96.00 % NC	180	3,124	2,686	0.02	0.00	84.0
11	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	2,953	3,313	0.70	0.00	97.4
11	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	180	2,953	3,313	0.00	0.35	96.3
11	3	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	2,666	0.30	0.00	91.9
11	4	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1,085	2,543	0.00	0.15	89.6
11	5	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1,156	2,549	0.07	0.01	85.2
11	6	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	105	1,570	2,624	0.02	0.00	84.3
11	7	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	160	1,156	2,549	0.04	0.00	83.8
11	8	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1,005	2,538	0.00	0.30	83.6
11	9	C-21A	C21B	DEP	17D1	96.00 % NC	0	911	2,666	0.01	0.00	83.5
11	10	C-21A	C21A	DEP	35D1	96.00 % NC	180	2,373	2,939	0.02	0.00	83.3
Grand Forks MOB 1												
Point	**Rank**	**Aircraft**	**Profile**	**Op Type**	**Track**	**Engine Power**	**Airspeed (KIAS)**	**Altitude (ft MSL)**	**Slant Distance (ft)**	**Operations Day**	**Operations Night**	**SEL (dB)**
1	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4408	3615	0.30	0.00	96.5
1	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4609	3831	0.00	0.15	94.5
1	3	KC-46X	46DA	DEP	17D1	92.00 % N1	185	1687	1142	2.04	0.04	93.1
1	4	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1591	1081	0.02	0.00	92.9
1	5	KC-46X	46CG	PAT	35C2	65.00 % N1	170	1453	559	16.11	1.79	92.4
1	6	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1591	1081	0.03	0.00	92.1
1	7	KC-46X	46CI	PAT	35C6	60.00 % N1	240	1399	474	6.04	0.67	91.8
1	8	KC-46X	46AF	ARR	35A6	65.00 % N1	170	1342	624	0.59	0.07	91.6
1	9	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1956	1341	0.00	0.35	91.3
1	10	KC-46X	46AG	ARR	35A8	65.00 % N1	180	1397	738	0.71	0.08	90.5
2	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4077	3312	0.30	0.00	97.3
2	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4187	3436	0.00	0.15	95.7
2	3	KC-46X	46DA	DEP	17D1	92.00 % N1	185	1530	1095	2.04	0.04	93.7
2	4	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1388	1022	0.02	0.00	93.6
2	5	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1388	1022	0.03	0.00	92.7
2	6	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1675	1184	0.00	0.35	92.5
2	7	KC-46X	46CE	PAT	17C7	85.00 % N1	190	2116	1286	2.59	0.29	91.2
2	8	KC-135R	135AB	ARR	35A3	65.00 % NF	150	1292	980	0.07	0.01	90.0
2	9	KC-46X	46CC	PAT	17C5	85.00 % N1	200	1734	1431	5.18	0.58	89.5
2	10	C-130H&N&P	130C	ARR	35A3	650.00 C TIT	110	1289	979	0.02	0.00	89.3
3	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3907	3451	0.70	0.00	97.1
3	2	KC-46X	46CG	PAT	35C2	85.00 % N1	200	1469	799	16.11	1.79	95.9

Table C-1-3. Noise Contributors at Representative Locations Near Grand Forks AFB Under Baseline and MOB 1 Scenario (Continued)

Grand Forks MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
3	3	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	3966	3518	0.00	0.35	95.6
3	4	KC-46X	46CF	PAT	35C1	88.00 % N1	200	1676	806	11.69	1.30	95.4
3	5	KC-46X	46DC	DEP	35D1	92.00 % N1	160	1299	1680	4.76	0.09	89.7
3	6	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1771	1857	0.00	0.15	89.5
3	7	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1247	1668	0.00	0.30	89.1
3	8	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1299	1680	0.07	0.01	88.9
3	9	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	160	1299	1680	0.04	0.00	88.4
3	10	KC-46X	46CH	PAT	35C5	85.00 % N1	200	1668	1772	12.08	1.34	87.9
4	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	4176	5194	0.70	0.00	92.8
4	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	4302	5288	0.00	0.35	91.2
4	3	KC-46X	46CF	PAT	35C1	88.00 % N1	200	1878	1488	11.69	1.30	89.8
4	4	KC-46X	46CG	PAT	35C2	85.00 % N1	200	1555	1629	16.11	1.79	88.1
4	5	KC-46X	46DD	DEP	35D7	92.00 % N1	200	3361	2505	1.31	0.00	85.2
4	6	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	2091	4181	0.00	0.15	82.9
4	7	KC-46X	46CI	PAT	35C6	85.00 % N1	190	1635	2912	6.04	0.67	82.8
4	8	KC-46X	46CH	PAT	35C5	85.00 % N1	200	2018	2905	12.08	1.34	82.3
4	9	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	8415	0.30	0.00	81.7
4	10	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1360	4028	0.00	0.30	81.1
5	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3903	3187	0.70	0.00	97.7
5	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	3961	3257	0.00	0.35	96.2
5	3	KC-46X	46DC	DEP	35D1	92.00 % N1	160	1298	1034	4.76	0.09	94.7
5	4	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	160	1298	1034	0.04	0.00	93.6
5	5	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1245	1015	0.00	0.30	93.0
5	6	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1298	1034	0.07	0.01	92.8
5	7	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1766	1301	0.00	0.15	92.0
5	8	KC-46X	46CH	PAT	35C5	85.00 % N1	200	1647	1230	12.08	1.34	91.3
5	9	KC-46X	46CJ	PAT	35C7	85.00 % N1	190	1980	1302	6.04	0.67	91.2
5	10	KC-135R	135AA	ARR	17A1	65.00 % NF	150	1207	1002	0.03	0.00	89.7
6	1	KC-46X	46CB	PAT	17C2	85.00 % N1	200	1562	1001	6.91	0.77	93.9
6	2	KC-46X	46CA	PAT	17C1	85.00 % N1	200	1891	1093	5.01	0.56	93.0
6	3	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4077	5408	0.30	0.00	92.4
6	4	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4188	5485	0.00	0.15	90.9
6	5	KC-46X	46CD	PAT	17C6	85.00 % N1	190	1641	2164	2.59	0.29	86.3
6	6	KC-46X	46DB	DEP	17D7	92.00 % N1	200	3360	2452	0.56	0.00	86.1
6	7	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1676	4440	0.00	0.35	82.8
6	8	T-45	MQ4DB	DEP	35D8	100.00 % RPM	0	911	7991	0.70	0.00	82.5
6	9	KC-46X	46CC	PAT	17C5	85.00 % N1	200	1992	3633	5.18	0.58	79.8
6	10	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1388	4400	0.03	0.00	79.8
7	1	KC-46X	46CG	PAT	35C2	85.00 % N1	200	1747	1062	16.11	1.79	93.9
7	2	KC-46X	46CI	PAT	35C6	85.00 % N1	190	1822	1063	6.04	0.67	93.9

Table C-1-3. Noise Contributors at Representative Locations Near Grand Forks AFB Under Baseline and MOB 1 Scenario (Continued)

Grand Forks MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
7	3	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3814	9974	0.70	0.00	85.1
7	4	KC-46X	46CF	PAT	35C1	88.00 % N1	200	2276	2286	11.69	1.30	85.0
7	5	T-45	MQ4CB	PAT	35C9	85.00 % RPM	200	6911	8248	0.00	0.35	83.4
7	6	KC-46X	46DD	DEP	35D7	92.00 % N1	200	3651	3616	1.31	0.00	82.7
7	7	KC-46X	46AC	ARR	17A8	65.00 % N1	200	1911	1833	0.30	0.03	80.8
7	8	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	10578	0.30	0.00	79.3
7	9	T-45	MQ4CA	PAT	17C9	85.00 % RPM	200	6911	8248	0.00	0.15	77.7
7	10	KC-46X	46AB	ARR	17A6	65.00 % N1	190	1910	2662	0.25	0.03	77.6
8	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	3324	5319	0.70	0.00	92.6
8	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	180	3324	5319	0.00	0.35	91.3
8	3	KC-46X	46CI	PAT	35C6	85.00 % N1	190	1596	2407	6.04	0.67	86.7
8	4	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	5209	0.30	0.00	86.4
8	5	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1307	4705	0.00	0.15	84.8
8	6	KC-46X	46AF	ARR	35A6	60.00 % N1	220	2052	1333	0.59	0.07	82.1
8	7	KC-46X	46DD	DEP	35D7	92.00 % N1	185	2322	4486	1.31	0.00	81.9
8	8	KC-46X	46CG	PAT	35C2	85.00 % N1	200	1508	3735	16.11	1.79	80.1
8	9	KC-46X	46CF	PAT	35C1	88.00 % N1	200	1676	3990	11.69	1.30	79.8
8	10	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1202	4696	0.07	0.01	79.5
9	1	T-45	MQ4DA	DEP	17D8	100.00 % RPM	150	4408	3935	0.30	0.00	95.6
9	2	T-45	MQ4CA	PAT	17C9	100.00 % RPM	200	4608	4134	0.00	0.15	93.7
9	3	T-45	MQ4CB	PAT	35C9	88.00 % RPM	180	1955	2048	0.00	0.35	88.1
9	4	KC-46X	46CE	PAT	17C7	85.00 % N1	190	2364	1646	2.59	0.29	87.9
9	5	KC-135R	135DA	DEP	17D1	87.00 % NF	200	1591	1887	0.03	0.00	87.5
9	6	KC-46X	46DA	DEP	17D1	92.00 % N1	185	1687	1923	2.04	0.04	87.5
9	7	KC-10A	KC-10-B	DEP	17D1	87.00 % N1	200	1591	1887	0.02	0.00	86.8
9	8	KC-135R	135AB	ARR	35A3	65.00 % NF	150	1421	1833	0.07	0.01	84.8
9	9	C-130H&N&P	130B	DEP	17D1	932.00 C TIT	170	2340	2270	0.01	0.00	84.4
9	10	C-130H&N&P	130C	ARR	35A3	650.00 C TIT	110	1418	1832	0.02	0.00	84.1
10	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	4199	3648	0.70	0.00	96.4
10	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	200	4331	3786	0.00	0.35	94.7
10	3	KC-46X	46DC	DEP	35D1	92.00 % N1	185	1458	1575	4.76	0.09	90.1
10	4	KC-46X	46CJ	PAT	35C7	85.00 % N1	190	2229	1454	6.04	0.67	89.9
10	5	T-45	MQ4AA	ARR	17A11	88.00 % RPM	180	1370	1545	0.00	0.30	89.8
10	6	KC-135R	135DB	DEP	35D1	87.00 % NF	200	1458	1575	0.07	0.01	89.2
10	7	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	2118	1925	0.00	0.15	88.8
10	8	KC-10A	KC-10-D	DEP	35D1	87.00 % N1	200	1458	1575	0.04	0.00	88.8
10	9	KC-46X	46CE	PAT	17C7	65.00 % N1	180	1302	1167	2.59	0.29	86.5
10	10	KC-135R	135AA	ARR	17A1	65.00 % NF	150	1315	1529	0.03	0.00	86.3
11	1	T-45	MQ4DB	DEP	35D8	100.00 % RPM	150	2953	3313	0.70	0.00	97.4
11	2	T-45	MQ4CB	PAT	35C9	100.00 % RPM	180	2953	3313	0.00	0.35	96.3
11	3	T-45	MQ4DA	DEP	17D8	100.00 % RPM	0	911	2666	0.30	0.00	91.9
11	4	T-45	MQ4CA	PAT	17C9	88.00 % RPM	180	1085	2543	0.00	0.15	89.6
11	5	KC-46X	46CI	PAT	35C6	85.00 % N1	190	1441	2051	6.04	0.67	88.4

Table C-1-3. Noise Contributors at Representative Locations Near Grand Forks AFB Under Baseline and MOB 1 Scenario (Continued)

Grand Forks MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
11	6	KC-46X	46DD	DEP	35D7	92.00 % N1	185	1329	2575	1.31	0.00	86.1
11	7	KC-135R	135DB	DEP	35D1	87.00 % NF	160	1156	2549	0.07	0.01	85.2
11	8	KC-46X	46DC	DEP	35D1	92.00 % N1	160	1149	2548	4.76	0.09	84.9
11	9	C-130H&N&P	130A	DEP	35D1	977.00 C TIT	105	1570	2624	0.02	0.00	84.3
11	10	KC-46X	46CF	PAT	35C1	88.00 % N1	200	1330	2568	11.69	1.30	84.2

Key: Power Units: C TIT = Turbine Inlet Temperature in Celsius; LBS= Pounds of Thrust; N1 = engine speed at Location No. 1; NC = core engine speed; NF = engine fan revolutions per minute; RPM = revolutions per minute.
Source: NOISEMAP Version 7.2.

Table C-1-4. Noise Contributors at Representative Locations Near McConnell AFB Under Baseline, FTU and MOB 1 Scenarios

McConnell Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	1	F-16C	F16C-DK	DEP	9RD4	90.00 % NC	250	1,811	4,552	1.19	0.04	94.2
1	2	F-16C	F16C-CB	PAT	9LC1	92.00 % NC	250	2,215	5,429	0.38	0.00	93.9
1	3	B-747-20A	747-D2	DEP	9RD4	34530.00 LBS	153	3,001	4,845	0.15	0.00	86.7
1	4	T-38C	T38C-DS	DEP	9RD4	95.00 % RPM	250	3,089	4,889	1.19	0.04	85.9
1	5	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	150	1,646	5,358	0.16	0.00	82.8
1	6	T-38C	T38C-DR	DEP	1LD1	100.00 % RPM	0	1,371	6,911	0.51	0.02	82.8
1	7	F-16C	F16C-DJ	DEP	1LD1	93.00 % NC	0	1,371	6,911	0.51	0.02	82.4
1	8	A-10A	A10A-DB	DEP	9RD4	6700.00 NF	160	4,063	5,402	1.19	0.04	81.0
1	9	KC-135R	9RCC	PAT	9RC2	70.00 % NF	145	1,680	4,538	2.35	0.57	80.8
1	10	KC-135R	135B	DEP	9RD4	89.60 % NF	160	2,283	4,634	1.19	0.04	80.6
2	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	2,346	1,015	0.51	0.02	107.5
2	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,397	2,689	0.16	0.00	100.7
2	3	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,677	345	0.37	0.01	98.9
2	4	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,993	657	0.15	0.00	96.3
2	5	KC-135R	9RCB	PAT	9RC1	65.00 % NF	180	1,800	466	4.27	1.21	95.2
2	6	KC-135R	19RAE	ARR	9RA4	70.00 % NF	145	2,007	671	0.25	0.07	94.1
2	7	KC-135R	19RAD	ARR	9RA3	70.00 % NF	145	2,007	671	1.23	0.35	94.1
2	8	KC-135R	19RAB	ARR	9RA1	70.00 % NF	145	2,007	671	0.34	0.09	94.1
2	9	KC-135R	19RAA	ARR	9RA2	70.00 % NF	145	2,007	671	1.05	0.30	94.1
2	10	KC-135R	135C	ARR	9RA2	66.50 % NF	160	1,992	656	1.19	0.04	93.1
3	1	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	240	2,999	4,792	0.16	0.00	94.7
3	2	KC-135R	1RCB	PAT	1RC2	80.00 % NF	170	2,621	1,260	0.13	0.06	89.4
3	3	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	250	1,759	8,316	0.51	0.02	86.9
3	4	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	240	3,000	4,792	0.38	0.00	83.4
3	5	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	2,774	8,426	0.51	0.02	81.5
3	6	B-747-20A	747-D1	DEP	1LD1	34530.00 LBS	153	2,849	8,434	0.07	0.00	80.9
3	7	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	9,081	1.19	0.04	79.3
3	8	KC-135R	9RCC	PAT	9RC2	70.00 % NF	145	1,871	3,978	2.35	0.57	79.0
3	9	KC-135R	9LCB	PAT	9LC2	70.00 % NF	185	2,999	4,793	0.24	0.11	78.4
3	10	KC-135R	135C1	PAT	1RC1	70.00 % NF	180	3,000	4,792	0.33	0.00	77.4
4	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	1,987	4,272	0.51	0.02	94.6
4	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,291	5,297	0.16	0.00	93.6
4	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,181	4,608	0.07	0.00	85.8
4	4	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	3,666	4,848	0.51	0.02	83.5
4	5	KC-135R	135D	DEP	1LD1	89.60 % NF	200	2,371	4,347	0.51	0.02	81.0
4	6	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,840	4,252	0.15	0.00	80.9
4	7	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,773	5,068	0.38	0.00	80.7
4	8	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	9,059	1.19	0.04	80.3
4	9	A-10A	A10A-DA	DEP	1LD1	6700.00 NF	160	4,928	5,679	0.51	0.02	80.2
4	10	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,674	4,235	0.37	0.01	80.0
5	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	250	1,776	3,715	0.51	0.02	96.2
5	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,172	4,595	0.16	0.00	95.9

Table C-1-4. Noise Contributors at Representative Locations Near McConnell AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

McConnell Baseline												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
5	3	B-747-20A	747-D1	DEP	1LD1	34530.00 LBS	153	2,898	4,016	0.07	0.00	88.9
5	4	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	2,874	4,017	0.51	0.02	88.6
5	5	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	150	1,602	4,523	0.38	0.00	84.9
5	6	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	5,569	1.19	0.04	84.5
5	7	A-10A	A10A-DA	DEP	1LD1	6700.00 NF	160	3,744	4,494	0.51	0.02	83.2
5	8	KC-135R	135D	DEP	1LD1	89.60 % NF	160	2,179	3,788	0.51	0.02	82.6
5	9	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,639	3,701	0.15	0.00	81.9
5	10	F-16C	F16C-DK	DEP	9RD4	93.00 % NC	0	1,371	5,569	1.19	0.04	81.0
6	1	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,519	3,686	0.16	0.00	97.6
6	2	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	2,771	3,940	0.51	0.02	95.3
6	3	KC-135R	19LAD	ARR	9LA4	65.00 % NF	160	2,403	1,091	0.02	0.01	89.2
6	4	KC-135R	19LAB	ARR	9LA2	65.00 % NF	160	2,403	1,091	0.11	0.05	89.1
6	5	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,453	4,233	0.07	0.00	84.5
6	6	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	2,174	3,761	0.15	0.00	82.7
6	7	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	2,069	2,931	0.38	0.00	82.4
6	8	KC-135R	9LCB	PAT	9LC2	70.00 % NF	165	2,180	3,085	0.24	0.11	82.3
6	9	KC-135R	135D	DEP	1LD1	89.60 % NF	250	2,398	3,818	0.51	0.02	81.7
6	10	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,680	3,683	0.37	0.01	81.6
7	1	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,528	3,331	0.16	0.00	101.0
7	2	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	1,992	5,488	0.51	0.02	92.0
7	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,182	5,748	0.07	0.00	83.8
7	4	KC-135R	135C1	PAT	1RC1	84.70 % NF	180	2,869	3,300	0.33	0.00	83.2
7	5	KC-135R	9LCB	PAT	9LC2	70.00 % NF	165	2,072	3,616	0.24	0.11	82.3
7	6	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	3,674	5,943	0.51	0.02	81.9
7	7	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,774	4,642	0.38	0.00	81.8
7	8	KC-135R	1RCA	PAT	1RC1	80.00 % NF	200	2,869	3,300	2.73	0.94	81.6
7	9	KC-135R	9RCC	PAT	9RC2	70.00 % NF	145	1,871	3,884	2.35	0.57	79.2
7	10	KC-135R	19LAD	ARR	9LA4	65.00 % NF	145	1,822	4,647	0.02	0.01	79.1
8	1	F-16C	F16C-DK	DEP	9RD4	90.00 % NC	325	2,629	1,884	1.19	0.04	102.4
8	2	F-16C	F16C-CB	PAT	9LC1	92.00 % NC	250	2,456	3,552	0.38	0.00	97.8
8	3	KC-135R	9RCC	PAT	9RC2	70.00 % NF	145	1,870	640	2.35	0.57	95.1
8	4	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	180	2,016	877	0.16	0.00	92.3
8	5	KC-135R	1RAC	ARR	1RA1	70.00 % NF	145	2,116	962	0.29	0.08	91.3
8	6	B-747-20A	747-A1	ARR	1LA3	6340.00 LBS	131	2,114	1,553	0.07	0.00	91.0
8	7	KC-135R	135C1	PAT	1RC1	65.00 % NF	150	2,044	900	0.33	0.00	90.6
8	8	KC-135R	1RCA	PAT	1RC1	65.00 % NF	150	2,044	900	2.73	0.94	90.6
8	9	KC-135R	1RAA	ARR	1RA5	65.00 % NF	160	2,096	945	0.91	0.26	90.2
8	10	B-747-20A	747-D2	DEP	9RD4	23954.00 LBS	181	3,403	2,491	0.15	0.00	89.5

Table C-1-4. Noise Contributors at Representative Locations Near McConnell AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

McConnell FTU												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	1	F-16C	F16C-DK	DEP	9RD4	90.00 % NC	250	1,811	4,552	1.19	0.04	94.2
1	2	F-16C	F16C-CB	PAT	9LC1	92.00 % NC	250	2,215	5,429	0.38	0.00	93.9
1	3	B-747-20A	747-D2	DEP	9RD4	34530.00 LBS	153	3,001	4,845	0.15	0.00	86.7
1	4	T-38C	T38C-DS	DEP	9RD4	95.00 % RPM	250	3,089	4,889	1.19	0.04	85.9
1	5	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	150	1,646	5,358	0.16	0.00	82.8
1	6	T-38C	T38C-DR	DEP	1LD1	100.00 % RPM	0	1,371	6,911	0.51	0.02	82.8
1	7	F-16C	F16C-DJ	DEP	1LD1	93.00 % NC	0	1,371	6,911	0.51	0.02	82.4
1	8	A-10A	A10A-DB	DEP	9RD4	6700.00 NF	160	4,063	5,402	1.19	0.04	81.0
1	9	KC-135R	9RCC	PAT	9RC2	70.00 % NF	145	1,680	4,538	2.35	0.57	80.8
1	10	KC-135R	135B	DEP	9RD4	89.60 % NF	160	2,283	4,634	1.19	0.04	80.6
2	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	2,346	1,015	0.51	0.02	107.5
2	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,397	2,689	0.16	0.00	100.7
2	3	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,677	345	0.37	0.01	98.9
2	4	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,993	657	0.15	0.00	96.3
2	5	KC-135R	9RCB	PAT	9RC1	65.00 % NF	180	1,800	466	4.27	1.21	95.2
2	6	KC-135R	19RAE	ARR	9RA4	70.00 % NF	145	2,007	671	0.25	0.07	94.1
2	7	KC-135R	19RAD	ARR	9RA3	70.00 % NF	145	2,007	671	1.23	0.35	94.1
2	8	KC-135R	19RAB	ARR	9RA1	70.00 % NF	145	2,007	671	0.34	0.09	94.1
2	9	KC-135R	19RAA	ARR	9RA2	70.00 % NF	145	2,007	671	1.05	0.30	94.1
2	10	KC-135R	135C	ARR	9RA2	66.50 % NF	160	1,992	656	1.19	0.04	93.1
3	1	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	240	2,999	4,792	0.16	0.00	94.7
3	2	KC-135R	1RCB	PAT	1RC2	80.00 % NF	170	2,621	1,260	0.13	0.06	89.4
3	3	KC-46X	46RCD	PAT	1RC3	85.00 % N1	180	2,214	1,510	0.46	0.10	88.5
3	4	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	250	1,759	8,316	0.51	0.02	86.9
3	5	KC-46X	46RCB	PAT	1RC2	85.00 % N1	190	3,131	1,764	2.30	0.50	85.5
3	6	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	240	3,000	4,792	0.38	0.00	83.4
3	7	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	2,774	8,426	0.51	0.02	81.5
3	8	B-747-20A	747-D1	DEP	1LD1	34530.00 LBS	153	2,849	8,434	0.07	0.00	80.9
3	9	KC-46X	46RDM	DEP	1RD4	92.00 % N1	200	3,887	4,827	1.27	1.77	79.7
3	10	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	9,081	1.19	0.04	79.3
4	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	1,987	4,272	0.51	0.02	94.6
4	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,291	5,297	0.16	0.00	93.6
4	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,181	4,608	0.07	0.00	85.8
4	4	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	3,666	4,848	0.51	0.02	83.5
4	5	KC-135R	135D	DEP	1LD1	89.60 % NF	200	2,371	4,347	0.51	0.02	81.0
4	6	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,840	4,252	0.15	0.00	80.9
4	7	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,773	5,068	0.38	0.00	80.7
4	8	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	9,059	1.19	0.04	80.3
4	9	A-10A	A10A-DA	DEP	1LD1	6700.00 NF	160	4,928	5,679	0.51	0.02	80.2
4	10	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,674	4,235	0.37	0.01	80.0

Table C-1-4. Noise Contributors at Representative Locations Near McConnell AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

McConnell FTU												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
5	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	250	1,776	3,715	0.51	0.02	96.2
5	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,172	4,595	0.16	0.00	95.9
5	3	B-747-20A	747-D1	DEP	1LD1	34530.00 LBS	153	2,898	4,016	0.07	0.00	88.9
5	4	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	2,874	4,017	0.51	0.02	88.6
5	5	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	150	1,602	4,523	0.38	0.00	84.9
5	6	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	5,569	1.19	0.04	84.5
5	7	A-10A	A10A-DA	DEP	1LD1	6700.00 NF	160	3,744	4,494	0.51	0.02	83.2
5	8	KC-135R	135D	DEP	1LD1	89.60 % NF	160	2,179	3,788	0.51	0.02	82.6
5	9	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,639	3,701	0.15	0.00	81.9
5	10	F-16C	F16C-DK	DEP	9RD4	93.00 % NC	0	1,371	5,569	1.19	0.04	81.0
6	1	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,519	3,686	0.16	0.00	97.6
6	2	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	2,771	3,940	0.51	0.02	95.3
6	3	KC-135R	19LAD	ARR	9LA4	65.00 % NF	160	2,403	1,091	0.02	0.01	89.2
6	4	KC-135R	19LAB	ARR	9LA2	65.00 % NF	160	2,403	1,091	0.11	0.05	89.1
6	5	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,453	4,233	0.07	0.00	84.5
6	6	KC-46X	46LAM	ARR	9LA2	60.00 % N1	180	2,455	1,148	0.59	0.35	83.2
6	7	KC-46X	46LAK	ARR	9LA4	60.00 % N1	180	2,455	1,148	0.39	0.24	83.2
6	8	KC-46X	46LAH	ARR	9LA6	60.00 % N1	180	2,125	1,164	0.82	0.49	82.8
6	9	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	2,174	3,761	0.15	0.00	82.7
6	10	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	2,069	2,931	0.38	0.00	82.4
7	1	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,528	3,331	0.16	0.00	101.0
7	2	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	1,992	5,488	0.51	0.02	92.0
7	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,182	5,748	0.07	0.00	83.8
7	4	KC-46X	46RDM	DEP	1RD4	92.00 % N1	200	3,814	2,603	1.27	1.77	83.7
7	5	KC-46X	46RCC	PAT	1RC4	90.00 % N1	190	2,959	2,764	0.46	0.10	83.5
7	6	KC-135R	135C1	PAT	1RC1	84.70 % NF	180	2,869	3,300	0.33	0.00	83.2
7	7	KC-135R	9LCB	PAT	9LC2	70.00 % NF	165	2,072	3,616	0.24	0.11	82.3
7	8	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	3,674	5,943	0.51	0.02	81.9
7	9	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,774	4,642	0.38	0.00	81.8
7	10	KC-46X	46RCD	PAT	1RC3	85.00 % N1	180	2,114	3,079	0.46	0.10	81.7
8	1	F-16C	F16C-DK	DEP	9RD4	90.00 % NC	325	2,629	1,884	1.19	0.04	102.4
8	2	F-16C	F16C-CB	PAT	9LC1	92.00 % NC	250	2,456	3,552	0.38	0.00	97.8
8	3	KC-135R	9RCC	PAT	9RC2	70.00 % NF	145	1,870	640	2.35	0.57	95.1
8	4	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	180	2,016	877	0.16	0.00	92.3
8	5	KC-135R	1RAC	ARR	1RA1	70.00 % NF	145	2,116	962	0.29	0.08	91.3
8	6	B-747-20A	747-A1	ARR	1LA3	6340.00 LBS	131	2,114	1,553	0.07	0.00	91.0
8	7	KC-135R	135C1	PAT	1RC1	65.00 % NF	150	2,044	900	0.33	0.00	90.6
8	8	KC-135R	1RCA	PAT	1RC1	65.00 % NF	150	2,044	900	2.73	0.94	90.6
8	9	KC-135R	1RAA	ARR	1RA5	65.00 % NF	160	2,096	945	0.91	0.26	90.2
8	10	B-747-20A	747-D2	DEP	9RD4	23954.00 LBS	181	3,403	2,491	0.15	0.00	89.5

Table C-1-4. Noise Contributors at Representative Locations Near McConnell AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

McConnell MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
1	1	F-16C	F16C-DK	DEP	9RD4	90.00 % NC	250	1,811	4,552	1.19	0.04	94.2
1	2	F-16C	F16C-CB	PAT	9LC1	92.00 % NC	250	2,215	5,429	0.38	0.00	93.9
1	3	B-747-20A	747-D2	DEP	9RD4	34530.00 LBS	153	3,001	4,845	0.15	0.00	86.7
1	4	T-38C	T38C-DS	DEP	9RD4	95.00 % RPM	250	3,089	4,889	1.19	0.04	85.9
1	5	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	150	1,646	5,358	0.16	0.00	82.8
1	6	T-38C	T38C-DR	DEP	1LD1	100.00 % RPM	0	1,371	6,911	0.51	0.02	82.8
1	7	F-16C	F16C-DJ	DEP	1LD1	93.00 % NC	0	1,371	6,911	0.51	0.02	82.4
1	8	A-10A	A10A-DB	DEP	9RD4	6700.00 NF	160	4,063	5,402	1.19	0.04	81.0
1	9	KC-135R	135B	DEP	9RD4	89.60 % NF	160	2,283	4,634	1.19	0.04	80.6
1	10	B-747-20A	747-A1	ARR	1LA3	6340.00 LBS	131	1,694	4,540	0.07	0.00	79.9
2	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	2,346	1,015	0.51	0.02	107.5
2	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,397	2,689	0.16	0.00	100.7
2	3	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,677	345	0.37	0.01	98.9
2	4	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,993	657	0.15	0.00	96.3
2	5	KC-135R	135C	ARR	9RA2	66.50 % NF	160	1,992	656	1.19	0.04	93.1
2	6	C-130H&N&P	130HAA	ARR	9RA2	650.00 C TIT	110	1,991	655	0.37	0.01	92.9
2	7	KC-135R	135D	DEP	1LD1	89.60 % NF	200	2,371	1,032	0.51	0.02	92.8
2	8	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,908	934	0.38	0.00	91.8
2	9	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,305	1,967	0.07	0.00	91.4
2	10	T-38C	T38C	ARR	9RA2	88.00 % RPM	160	1,992	656	1.19	0.04	90.8
3	1	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	240	2,999	4,792	0.16	0.00	94.7
3	2	KC-46X	46RCD	PAT	1RC3	85.00 % N1	180	2,214	1,510	2.59	0.29	88.5
3	3	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	250	1,759	8,316	0.51	0.02	86.9
3	4	KC-46X	46RCB	PAT	1RC2	85.00 % N1	190	3,131	1,764	5.18	0.58	85.5
3	5	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	240	3,000	4,792	0.38	0.00	83.4
3	6	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	2,774	8,426	0.51	0.02	81.5
3	7	B-747-20A	747-D1	DEP	1LD1	34530.00 LBS	153	2,849	8,434	0.07	0.00	80.9
3	8	KC-46X	46RDM	DEP	1RD4	92.00 % N1	200	3,887	4,827	0.56	0.00	79.7
3	9	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	9,081	1.19	0.04	79.3
3	10	KC-135R	135C1	PAT	1RC1	70.00 % NF	180	3,000	4,792	0.33	0.00	77.4
4	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	1,987	4,272	0.51	0.02	94.6
4	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,291	5,297	0.16	0.00	93.6
4	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,181	4,608	0.07	0.00	85.8
4	4	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	3,666	4,848	0.51	0.02	83.5
4	5	KC-135R	135D	DEP	1LD1	89.60 % NF	200	2,371	4,347	0.51	0.02	81.0
4	6	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,840	4,252	0.15	0.00	80.9
4	7	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,773	5,068	0.38	0.00	80.7
4	8	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	9,059	1.19	0.04	80.3
4	9	A-10A	A10A-DA	DEP	1LD1	6700.00 NF	160	4,928	5,679	0.51	0.02	80.2
4	10	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,674	4,235	0.37	0.01	80.0
5	1	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	250	1,776	3,715	0.51	0.02	96.2
5	2	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,172	4,595	0.16	0.00	95.9

Table C-1-4. Noise Contributors at Representative Locations Near McConnell AFB Under Baseline, FTU and MOB 1 Scenarios (Continued)

McConnell MOB 1												
Point	Rank	Aircraft	Profile	Op Type	Track	Engine Power	Airspeed (KIAS)	Altitude (ft MSL)	Slant Distance (ft)	Operations		SEL (dB)
										Day	Night	
5	3	B-747-20A	747-D1	DEP	1LD1	34530.00 LBS	153	2,898	4,016	0.07	0.00	88.9
5	4	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	2,874	4,017	0.51	0.02	88.6
5	5	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	150	1,602	4,523	0.38	0.00	84.9
5	6	T-38C	T38C-DS	DEP	9RD4	100.00 % RPM	0	1,371	5,569	1.19	0.04	84.5
5	7	A-10A	A10A-DA	DEP	1LD1	6700.00 NF	160	3,744	4,494	0.51	0.02	83.2
5	8	KC-135R	135D	DEP	1LD1	89.60 % NF	160	2,179	3,788	0.51	0.02	82.6
5	9	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	1,639	3,701	0.15	0.00	81.9
5	10	F-16C	F16C-DK	DEP	9RD4	93.00 % NC	0	1,371	5,569	1.19	0.04	81.0
6	1	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,519	3,686	0.16	0.00	97.6
6	2	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	2,771	3,940	0.51	0.02	95.3
6	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,453	4,233	0.07	0.00	84.5
6	4	KC-46X	46LAH	ARR	9LA6	60.00 % N1	160	2,229	119	0.59	0.07	84.2
6	5	KC-46X	46LAM	ARR	9LA2	60.00 % N1	180	2,455	1,148	0.43	0.05	83.2
6	6	KC-46X	46LAK	ARR	9LA4	60.00 % N1	180	2,455	1,148	0.28	0.03	83.2
6	7	B-747-20A	747-A2	ARR	9RA2	6340.00 LBS	131	2,174	3,761	0.15	0.00	82.7
6	8	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	2,069	2,931	0.38	0.00	82.4
6	9	KC-135R	135D	DEP	1LD1	89.60 % NF	250	2,398	3,818	0.51	0.02	81.7
6	10	SK70 (UH-60A) BLACKH	HELC-AB	ARR	9RA2	150.00 KNOTS	150	1,680	3,683	0.37	0.01	81.6
7	1	F-16C	F16C-CA	PAT	1RC1	92.00 % NC	250	2,528	3,331	0.16	0.00	101.0
7	2	F-16C	F16C-DJ	DEP	1LD1	90.00 % NC	325	1,992	5,488	0.51	0.02	92.0
7	3	B-747-20A	747-D1	DEP	1LD1	23954.00 LBS	181	3,182	5,748	0.07	0.00	83.8
7	4	KC-46X	46RDM	DEP	1RD4	92.00 % N1	200	3,814	2,603	0.56	0.00	83.7
7	5	KC-135R	135C1	PAT	1RC1	84.70 % NF	180	2,869	3,300	0.33	0.00	83.2
7	6	T-38C	T38C-DR	DEP	1LD1	95.00 % RPM	250	3,674	5,943	0.51	0.02	81.9
7	7	KC-46X	46RCC	PAT	1RC4	85.00 % N1	190	2,959	2,764	2.59	0.29	81.9
7	8	F-16C	F16C-CB	PAT	9LC1	83.00 % NC	180	1,774	4,642	0.38	0.00	81.8
7	9	KC-46X	46RCD	PAT	1RC3	85.00 % N1	180	2,114	3,079	2.59	0.29	81.7
7	10	KC-46X	46RCA	PAT	1RC1	85.00 % N1	190	2,953	3,332	6.91	0.77	79.7
8	1	F-16C	F16C-DK	DEP	9RD4	90.00 % NC	325	2,629	1,884	1.19	0.04	102.4
8	2	F-16C	F16C-CB	PAT	9LC1	92.00 % NC	250	2,456	3,552	0.38	0.00	97.8
8	3	F-16C	F16C-CA	PAT	1RC1	83.00 % NC	180	2,016	877	0.16	0.00	92.3
8	4	B-747-20A	747-A1	ARR	1LA3	6340.00 LBS	131	2,114	1,553	0.07	0.00	91.0
8	5	KC-135R	135C1	PAT	1RC1	65.00 % NF	150	2,044	900	0.33	0.00	90.6
8	6	B-747-20A	747-D2	DEP	9RD4	23954.00 LBS	181	3,403	2,491	0.15	0.00	89.5
8	7	SK70 (UH-60A) BLACKH	HELA-AA	ARR	1LA3	150.00 KNOTS	150	1,679	1,372	0.16	0.01	89.4
8	8	KC-46X	46RCG	PAT	9RC2	60.00 % N1	150	1,725	659	0.17	0.02	89.1
8	9	KC-135R	135B	DEP	9RD4	89.60 % NF	200	2,371	1,702	1.19	0.04	88.6
8	10	KC-46X	46RDE	DEP	9LD2	92.00 % N1	185	2,894	1,685	0.85	0.01	87.6

Key: ARR = Arrival; DEP = Departure; PAT = Closed Pattern.
Power Units: LBS = pounds of thrust; N1 = engine speed at Location No. 1; NC = core engine speed; NF = engine fan revolutions per minute; RPM = revolutions per minute.
Source: NOISEMAP Version 7.2.

APPENDIX D

AIR QUALITY BACKGROUND INFORMATION AND EMISSION CALCULATIONS

This Appendix is contained on the CD-ROM on the back cover of this document.

APPENDIX E

BUILDINGS KNOWN TO CONTAIN ASBESTOS AND LEAD-BASED PAINT

APPENDIX E BUILDINGS KNOWN TO CONTAIN ASBESTOS, LEAD-BASED PAINT, OR POLYCHLORINATED BIPHENYLS

Appendix E, Tables E-1 through E-6, summarizes the buildings that would be affected by the KC-46A Formal Training Unit (FTU) and First Main Operating Base (MOB 1) beddown-related demolition, renovation, or alteration; their years of construction; and their potential to contain toxic substances (asbestos-containing material [ACM], lead-based paint [LBP], and polychlorinated biphenyls [PCBs]). Tables E-1 and E-2 summarize the project-related toxic substance information for the FTU and MOB 1 scenarios at Altus Air Force Base (AFB). Table E-3 summarizes this information for the MOB 1 mission at Fairchild AFB. Table E-4 summarizes this information for the MOB 1 mission at Grand Forks AFB. Tables E-5 and E-6 summarize this information for the FTU and MOB 1 scenarios at McConnell AFB.

Table E-1. Toxic Substances Associated with Projects for the KC-46A FTU Scenario at Altus AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 170	1972	X	[b]	[c]
Renovation				
Building 87, Group Headquarters and Mission Training	1986	X		[c]
Building 394, Contractor Supply Storage	1955	X	[b]	[c]
Additions/Alterations				
Building 285, Tail Enclosure and Tool Crib Expansion	1956	X	[b]	[c]
Building 193, Squadron Operations/Aircraft Maintenance Unit	1987	X		[c]
Building 518, Tail Enclosure and Fuel Cell Expansion	1971	[a]	[b]	[c]

[a] Building assumed to potentially contain ACM based on construction year of 1987 or older (i.e., year that Building 193, which has been positively identified as having ACM, was constructed).
[b] Building assumed to potentially contain LBP. Although no LBP surveys have been conducted, buildings constructed prior to 1978 may have LBP.
[c] None of the electrical transformers have PCB-containing oil (Wallace 2013).
Key: X = Toxic substance known to occur in the building.

Table E-2. Toxic Substances Associated with Projects for the KC-46A MOB 1 Scenario at Altus AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 82	1955	X	[b]	[c]
Building 171	1984	[a]		[c]
Building 551	1991			[c]
Building 554	1991			[c]
Building 557	1991			[c]
Building 563	1991			[c]
Building 564	1991			[c]
Building 565	1991			[c]
Renovation				
Building 87, Wing Headquarters (Operations Group, Air National Guard, and Air Force Reserve Command)	1986	X		[c]
Building 170, Aircraft Parts Storage/Contractor Supplies	1972	X	[b]	[c]
Building 285, Construct Interior Wall and Expand Hydraulic Shop	1956	X	[b]	[c]
Additions/Alterations				
Building 369, Add Vault	1952	X	[b]	[c]
Building 156, Gym Addition	1956	X	[b]	[c]

[a] Building assumed to potentially contain ACM based on construction year of 1987 or older (i.e., year that Building 193, which has been positively identified as having ACM, was constructed).
[b] Building assumed to potentially contain LBP. Although no LBP surveys have been conducted, buildings constructed prior to 1978 may have LBP.
[c] None of the electrical transformers have PCB-containing oil (Wallace 2013).
Key: X = Toxic substance known to occur in the building.

Table E-3. Toxic Substances Associated with Projects for the KC-46A MOB 1 Mission at Fairchild AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 1011	1958	[a]	[b]	[c]
Building 1013	1958	[a]	[b]	[c]
Building 1015	1958	[a]	[b]	[c]
Building 1017	1955	[a]	[b]	[c]
Building 1018	2001			
Building 1019	1958	[a]	[b]	[c]
Building 2120	1943	[a]	[b]	[c]
Renovation				
Building 1001, Fuselage Trainer	1955	[a]	[b]	[c]
Building 1003, Cargo Deployment Function	1958	[a]	[b]	[c]
Building 1025, Vehicle Servicing	1952	[a]	[b]	[c]
Building 1037, Transitional Wash Rack	1955	[a]	[b]	[c]
Building 2005, Squadron Operations and Aircraft Maintenance Unit	1997			
Building 2007, Squadron Operations and Aircraft Maintenance Unit	1998			
Building 2040, Operations Support Squadron and Aircraft Flight Equipment	1990			
Building 2050, General Maintenance Hangar	1943	X	X	[c]
Building 2090, Aircraft Flight Equipment	2000			
Building 2097, Squadron Operations and Aircraft Maintenance Unit	1998			
Building 2272, Dormitory Conversion	1986			
Building 2245	1943	[a]	[b]	[c]
Additions/Alterations				
Building 2045, Logistics Readiness Squadron	2002			
Building 2048, Weapons System Trainers, Boom Operator Trainers	1943	[a]	[b]	[c]

[a] Building assumed to potentially contain ACM. Thermal system insulation and surfacing material found in buildings constructed no later than 1980 are presumed ACMs (Fairchild AFB 2011a).

[b] Building assumed to potentially contain LBP. An LBP survey is conducted by a contractor prior to any renovation or demolition work at pre-1980 facilities at Fairchild AFB (Fairchild AFB 2011b).

[c] Fluorescent light ballasts in building constructed prior to 1979 that are not labeled PCB-free or are missing date-of-manufacture labels are assumed to contain PCBs and would be removed and handled in accordance with Federal and state regulations and the base Hazardous Waste Management Plan (Fairchild AFB 2011c).

Key: X = Toxic substance known to occur in the building.

Table E-4. Toxic Substances Associated with Projects for the KC-46A MOB 1 Mission at Grand Forks AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 531	1957	[a]	[b]	[c]
Building 635	1973	[a]	[b]	[c]
Renovation				
Building 221, Dormitory	1958	[a]	[b]	[c]
Building 307, Air National Guard Wing Headquarters	1959	[a]	[b]	[c]
Building 528, Base Operations	1957	[a]	[b]	[c]
Building 602, Remotely Piloted Aircraft Wing	1959	[a]	[b]	[c]
Building 607, Operations Group/Operations Support Squadron/Aircraft Maintenance Squadron	1959	[a]	[b]	[c]
Building 629, Squadron Operations/Aircraft Maintenance Unit	1997			[c]
Building 631, Squadron Operations/Aircraft Maintenance Unit	1998			[c]
Building 670, Supply Shop	1990			[c]
Additions/Alterations				
Building 556, Flight Stimulator (Weapons System Trainers, Boom Operator Trainers)	1983			[c]
Building 622, Composite Shop	1961	[a]	[b]	[c]
Building 649, General Maintenance Hangar (3-bay)/Alternate Mission Equipment	1987			[c]
Building 661, Aerospace Ground Equipment	1988			[c]

[a] Buildings constructed before 1980 are assumed to potentially have ACM (thermal system insulation and asphalt and vinyl flooring materials) (AFI 32-1052).
[b] Building is assumed to have LBP. All painted surfaces of buildings constructed before 1980 shall be assumed to contain LBP unless the paint has been tested and determined to be lead-free (Grand Forks AFB 2003).
[c] None of the transformers at Grand Forks AFB have PCB-containing oil (Grand Forks AFB 2009).

Table E-5. Toxic Substances Associated with Projects for the KC-46A FTU Scenario at McConnell AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 977	1977	[a]	[b]	[c]
Building 978	1974	X	[b]	[c]
Building 984	1988	[a]		[c]
Building 985	1987	[a]		[c]
Building 1110	1952	X	[b]	[c]
Building 1122	1958	[a]	[b]	[c]
Renovation				
Building 840, Squadron Operations and Aircrew Flight Equipment	2003			[c]
Additions/Alterations				
Building 1129, Composite Repair Facility	1966	X	[b]	[c]
Building 1170, Director of Maintenance Office	1988	X		[c]

[a] Building assumed to potentially contain ACM, based on construction year of 1988 or older (i.e., year that Building 1170, which has been positively identified as having ACM, was constructed).
[b] Building is assumed to potentially contain LBP. Although no LBP surveys have been conducted, buildings constructed prior to 1978 may have LBP.
[c] None of the electrical transformers have PCB-containing oil (Pettus 2013).
Key: X=Toxic substance known to occur in the building.

Table E-6. Toxic Substances Associated with Projects for the KC-46A MOB 1 Scenario at McConnell AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 973	1970	[a]	[b]	[c]
Building 977	1977	[a]	[b]	[c]
Building 978	1974	X	[b]	[c]
Building 984	1988	[a]		[c]
Building 985	1987	[a]		[c]
Building 1101	1991			[c]
Building 1102	Unknown			
Building 1106	1954	X	[b]	[c]
Building 1110	1952	X	[b]	[c]
Building 1122	1958	[a]	[b]	[c]
Renovation				
Building 1108, Air Transportable Galley/Latrine/Seat Pallet Facility	1966	X	[b]	[c]
Building 1094, 2/3 Weapons System Trainers and 2 Boom Operator Trainers	1988	[a]		[c]
Building 1129, Composite Shop	1966	[a]	[b]	[c]
Building 840, Squadron Operations/Aircrew Flight Equipment	2003			[c]
Building 1183, Squadron Operations/Aircrew Flight Equipment	1998			[c]
Building 1185, Squadron Operations	2001			[c]
Building 1186, Squadron Operations/Aircrew Flight Equipment	1999			[c]
Building 850, Air Force Reserve Command Wing Headquarters	Unknown			
Building 1218, Operations Group Headquarters	1942	[a]	[b]	[c]
Building 1107, Fleet Services	1954	X	[b]	[c]
Building 1166, Interior Modifications for Data and Voice Communications	1976	X	[b]	[c]
Building 1171, Move Aircraft Electrical and Environmental Systems Testing Equipment from Building 1106	1968	X	[b]	[c]
Building 1176, Move Hydraulic Test Stand from Building 1106	1967	[a]	[b]	[c]
Additions/Alterations				
Building 1092, 1 Weapons System Trainer and 1 Boom Operator Trainer	2000			[c]
Building 1220, Mobility Bag Storage Addition	1988	[a]		[c]
Building 852, Maintenance Training Facility	Unknown			

[a] Building assumed to potentially contain ACM based on construction year of 1988 or older (i.e., year that Building 1170, which has been positively identified as having ACM, was constructed).
[b] Building assumed to potentially contain LBP. Although no LBP surveys have been conducted, buildings constructed prior to 1978 may have LBP.
[c] None of the electrical transformers have PCB-containing oil (Pettus 2013).
Key: X=Toxic substance known to occur in the building.

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PUBLIC DOCUMENTS

Air Force Instructions

AFI 32-1052 – Facility Asbestos Management

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